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Commercial Fisheries Abstracts

U.S. DEPARTMENT OF COMMERCE
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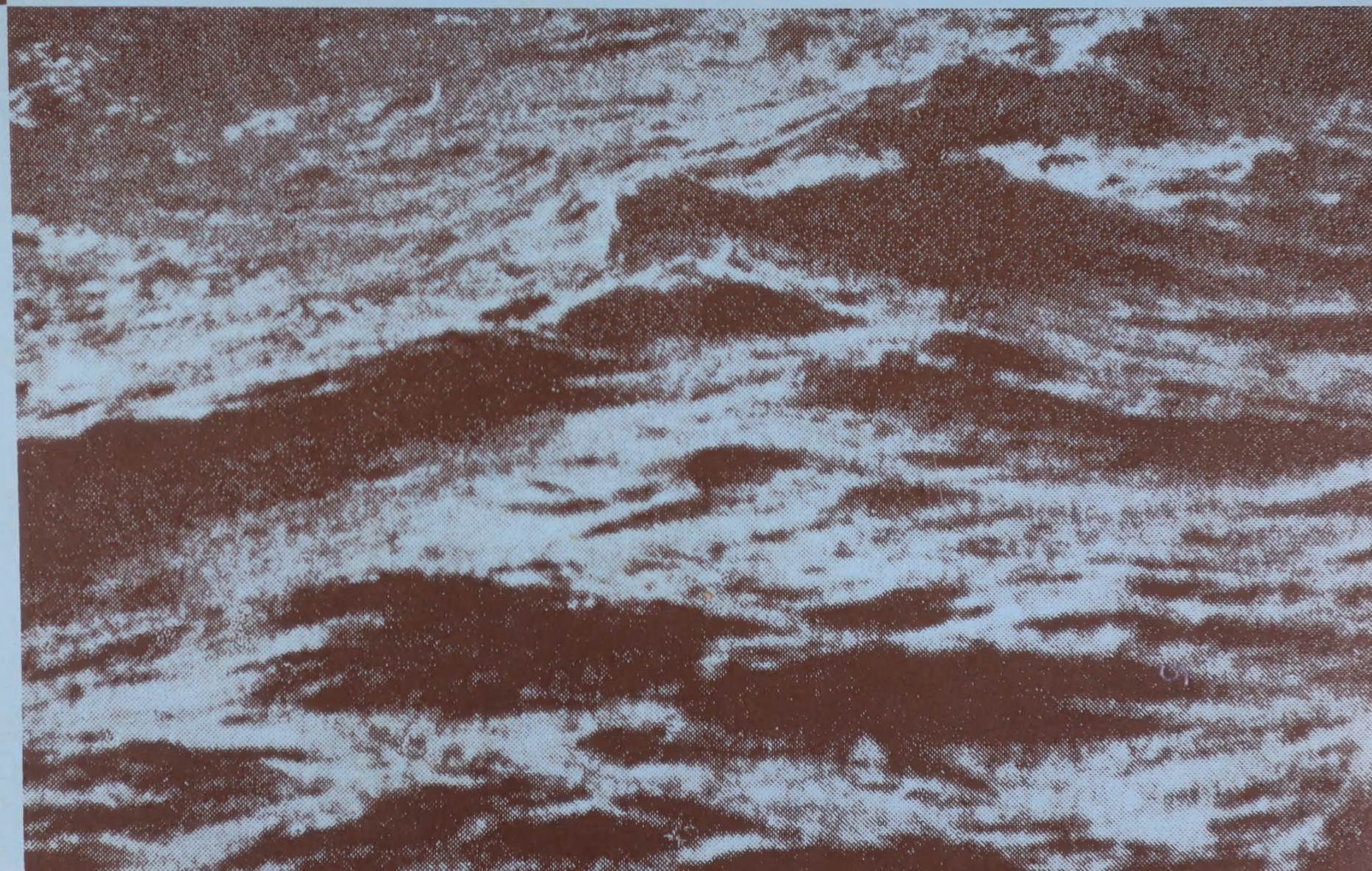

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 - Subscription price: $6.50 per year.

0.31 DISTRIBUTION OF TRANS-6-HEXADECENOIC AND OTHER FATTY ACIDS IN TISSUE AND ORGANS OF THE ATLANTIC LEATHERBACK TURTLE DERMOCHELYS CORIACEA CORIACEA L.

Ackman, R. G., S. N. Hooper, and J. C. Sipos (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
International Journal of Biochemistry 3, No. 14, 171-179 (Apr. 1972) (Scientechnica Publishers, Ltd., 42-44 Triangle West, Bristol, England BS8 1EX)

In previous work trans-6-hexadecenoic acid (t16:1ω10) was found to be a normal component of depot fat in three marine turtles including the leatherback.

Experiments on lipids in the fresh organs of a leatherback were performed to determine the distribution of t16:1ω10 acid, and to report details of other fatty acids in the tissue lipids.

The presence of trans-6-hexadecenoic acid was found in all samples tested. Some selectivity was indicated by incorporation of this compound into lipids of organs other than lung phospholipids. The authors suggest that the different proportions of t16:1ω10 acid relative to other C_{16} acids in various organs is due to different functional characteristics of phospholipids.

A total of 56 fatty acids and their percentage composition were determined from 10 organs of the leatherback turtle.

All phospholipids except those of the lung were enriched in arachidonic acid compared to the proportions of this acid in depot fat.

[3 tables, 20 references] SW

0.35 VISUAL PIGMENT OF THE COELACANTH

Dartnall, H. J. A. (MRC Vision Unit, University of Sussex, Falmer, Brighton, England)
Nature 239, No. 5371, 341,342 (Oct. 6, 1972)

[The eyes of most vertebrates contain two kinds of light receptor: rods, for vision in dim light; cones, for vision in bright light and color vision. The rods and cones contain a photosensitive pigment that bleaches on exposure to light. Some aspect of this process triggers a nervous excitation which, transmitted from neuron to neuron along optic pathways to the brain, ends in causing visual sensations.

Visual pigments contain vitamin A aldehyde bound as chromophore to a type of protein called opsin. Vitamin A aldehyde is also called retinal or retinaldehyde. Opsins combine with retinal to yield four pigments of vertebrate vision, one of which is rhodopsin. In rhodopsin the chromophore is found in a cis configuration of retinal, the 11-cis isomer. The only action of light in vision is to isomerize the chromophore of rhodopsin from the 11-cis configuration to all-trans configuration. In this reaction the structure of rhodopsin opens progressively, hydrolyzing finally to a mixture of opsin and all-trans retinal. Bleaching occurs in the progressive opening of the rhodopsin structure; and visual excitation must have occurred by this stage. Absorption spectra are used to characterize visual pigments. Abstractor's note]

A coelacanth was captured by native fishermen of the Comoro Islands [Moçambique Channel], on March 22, 1972. A quarter of one retina of the coelacanth

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0.35 TROUT TESTIS CELLS. I. CHARACTERIZATION BY DEOXYRIBONUCLEIC ACID AND PROTEIN ANALYSIS OF CELLS SEPARATED BY VELOCITY SEDIMENTATION

Louie, Andrew J., and Gordon H. Dixon (Department of Biochemistry, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of Biological Chemistry 247, No. 17, 5490-5497 (Sept. 10, 1972)

Following hormonal induction of spermatogenesis, trout testis cells pass through various stages: (1) The generation of a large number of precursor germ cells; (2) reduction-division of the chromosome complement to give rise to spermatids; (3) the packaging of spermatid DNA; and (4) the development of propulsive organelles, and other structures required for penetration of the egg.

Experiments were performed to determine the DNA, RNA, histone, and protamine content of the cells at each stage. Trout testis cells at different stages of spermatogenesis were separated by velocity sedimentation on serum albumin gradients in an ultracentrifuge; the cells in each region of separation were identified according to sedimentation velocity constants (Sv).

Using radioisotope techniques the cells at each stage were subjected to determinations of DNA and RNA. Using gel electrophoresis and autoradiography techniques, determinations of specific distribution of histones and protamines in the different cell types were performed.

Early stage cells sediment in a broad band between 2.5 and 4.5 Sv. These cells actively synthesize DNA. In addition, only histones are present in cells that sediment at 2.8 to 3.5 Sv.

(over)

0.35 TROUT TESTIS CELLS. II. SYNTHESIS AND PHOSPHORYLATION OF HISTONES AND PROTAMINES IN DIFFERENT CELL TYPES

Louie, Andrew J., and Gordon H. Dixon (Department of Biochemistry, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of Biological Chemistry 247, No. 17, 5498-5505 (Sept. 10, 1972)

Trout testis cells were labeled with radioisotopes of arginine or lysine and inorganic phosphate. The cells (at different stages of development) were separated according to sedimentation velocity constants (Sv) in serum albumin gradients. The basic proteins from cells at each stage were separated and analyzed for radioactivity in starch gels.

The results indicate that most of the histones were synthesized and phosphorylated in diploid cells (cells having double the basic (or haploid) number of chromosomes) that sediment in the range of 2.8 to 3.5 Sv. Very little synthesis or phosphorylation of histone occurred in the spermatids (middle stage cells).

Protamine synthesis begins in spermatid cells; the protamine is extensively phosphorylated.

The cellular specificity of histone phosphorylation suggests that this process is not required for the progressive loss of histones during the transition of spermatids sedimenting at 1.55 Sv to spermatids sedimenting to 1.0 Sv.

[6 figures, 2 tables, 34 references] SW

0.35

eye was washed, shaken in 35% sucrose solution, and centrifuged. Final treatment consisted of extraction with 2% digitonin solution.

The absorbance spectrum of the extract showed that only a little pigment was present. After treatment with a neutral hydroxylamine solution, and exposure to white light for 15 min., the absorbance spectrum was examined again. It was found to be λmax. at 473 nm. and was based on retinal.

Earlier work reported that most deep-living fishes and deep-diving mammals have visual pigments with λmax. in the range 477-487. The coelacanth thus shares pigment spectral position with other deep-living fishes. The author suggests that under conditions where the light level is very low the best visual performance will be mediated by a visual pigment, the absorbance maximum of which coincides with the peak of the ambient light.

[1 figure, 18 references] SW

0.36 LIPIDS OF COLD-WATER AND WARM-WATER PLANKTON-EATING FISH IN THE BLACK SEA

Lisovskaya, V. I. (U.S.S.R.)
Chemical Abstracts 76, No. 23, 138360t (June 5, 1972)

0.35 TROUT TESTIS CELLS. III. ACETYLATION OF HISTONES IN DIFFERENT CELL TYPES FROM DEVELOPING TROUT TESTIS

Candido, E. Peter M., and Gordon H. Dixon (Department of Biochemistry, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of Biological Chemistry 247, No. 17, 5506-5510 (Sept. 10, 1972)

Trout testis cells at different stages of spermatogenesis were separated by velocity sedimentation; the cells in each region of sediment were identified according to sedimentation velocity constants (Sv). Radioactivity was measured after incubating treated cells with radioisotopes. Starch gel electrophoresis techniques were also used.

Acetylation was observed in the spermatocytes (early stages) and spermatids (middle stages) of testis cell development. In the spermatocytes, histone synthesis and extensive acetylation occurred. In the spermatids there was histone acetylation but very little synthesis. At this stage the histones are gradually removed and replaced by protamine. The authors suggest that acetylation, which loosens the tight bond of histones to DNA, is necessary before enzymatic degradation of histones can take place.

[7 figures, 1 table, 23 references] MS

0.32 PROSPECTS OF USING SWINE PANCREAS ENZYME PREPARATIONS FOR OBTAINING PROTEIN HYDROLYZATES (0.38)

Klenkas, I. (Rizh. Med. Inst., Riga, U.S.S.R.)
Chemical Abstracts 77, No. 5, 31240x (July 31, 1972)

0.35

In cells of middle stage testis, a peak of sedimentation occurs at 1.5 Sv. A later stage appears as a shoulder on this peak where sedimentation occurs at 1.0 Sv. Cells at 1.5 to 1.0 Sv synthesize very little DNA; furthermore, histones and protamines are present in these cells. In mature sperm cells (which sediment at 0.6 Sv) only protamine is found.

[4 figures, 3 tables, 32 references] SW

0.35 ISOLATION AND IDENTIFICATION OF CILIATINE (2-AMINOETHYLPHOSPHONIC ACID) FROM PHOSPHOLIPIDS OF THE OYSTER, CRASSOSTREA GIGAS

Tamari, Masato, and Masao Kametaka (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 7, 1147-1152 (July 1972)

Ciliatine [H_2N-CH_2-CH_2-$PO(OH)_2$] (a naturally occurring compound containing a carbon-phosphorus bond) has been isolated from the protozoan Tetrahymena pyriformis, fresh-water molluscs, terrestrial mammals, and marine animals in the phyla coelenterata, mollusca, and echinoderamata. The biochemical role of ciliatine and the mechanism of its synthesis by living organisms is not yet known. Bacteria are able to use the phosphorus of ciliatine; also, when the compound was added to the diet of rats it was incorporated in the liver lipids of the animals. Because ciliatine is incorporated into the tissues of animals, the authors are making a survey of the distribution of this phosphonic acid in Mollusca. The present paper reports on their examination of the oyster C. gigas.

Seventy-six mg. of ciliatine were isolated from 72 g. of lipids of the oyster by a combination of ion-exchange chromatographic techniques. The ciliatine was also found in the hydrolyzates of a chloroform-methanol insoluble fraction of the oyster.

The authors do not know whether the compound is synthesized by the oyster or is furnished to them by symbiotic algae (the zooxanthellae) associated with the oyster. The authors suggest that the fixation of phosphorus into a covalent linkage with a carbon residue may enable the animals containing such compounds to retain an adequate supply of phosphorus for phospholipid metabolism in a marine environment in which phosphorus can be limiting.

[1 figure, 2 tables, 15 references] FTP

0.31 FATTY ACID COMPOSITION OF THE FATTY OIL OF CHILEAN ANCHOVY (ENGRAULIS RINGENS) AND ITS NEUTRAL AND POLAR FRACTIONS

Burgos Codercch, Marta T. (Chile)
Chemical Abstracts 76, No. 23, 139216n (June 5, 1972)

0.38 PROTEASE FORMATION BY A MARINE PSYCHROPHILIC BACTERIUM

Kato, Nobuo, Toru Nagasawa, Yoshiki Tani, and Koichi Ogata (Dept. of Agricultural Chemistry, Kyoto University, Kyoto, Japan)
Agricultural and Biological Chemistry 36, No. 7, 1177-1184 (July 1972)

Many psychrophilic bacteria from marine and terrestrial origin produce proteases in culture fluid. During the course of a study of the physiological characteristics of psychrophilic bacteria, the authors found that the marine psychrophilic bacterium Pseudomonas sp. strain No. 548 showed the highest proteolytic activity of the organisms examined. The characteristics of this particular bacterium, its production of protease, and the characteristics of the protease are being studied and will be reported in a series of papers. The present paper, the first in the series, reports on the effects of cultural conditions on the production of protease by the marine psychrophilic bacterium, Pseudomonas sp. No. 548.

The Pseudomonas sp. required salts of sea water to grow and to produce protease; optimum temperature for growth was 20° C. Protease formation was greatest at 5° C. and decreased with increasing temperature. Two components of the protease system having proteolytic activity were isolated by means of chromatography with DEAE-cellulose. The activity ratio of fraction I to fraction II increased as the temperature was increased.

[4 figures, 8 tables, 22 references] FTP

0.38 ISOLATION AND CHARACTERIZATION OF PANCREATIC PROCARBOXYPEPTIDASE B AND CARBOXYPEPTIDASE B OF THE AFRICAN LUNGFISH

Reeck, Gerald R., and Hans Neurath (Dept. of Biochemistry, University of Washington, Seattle, WA 98195)
Biochemistry 11, No. 21, 3947-3955 (Oct. 10, 1972)

As part of a study of the phylogenetic variations of the structure and function of certain proteases, the authors examined the pancreatic zymogens and enzymes of the African lungfish Protopterus aethiopicus. This information contributes to the body of knowledge of the evolutionary patterns of pancreatic proteases.

The procarboxypeptidase B of the African lungfish was purified by a combination of ion-exchange chromatography, affinity chromatography, and gel filtration, and was characterized. The monomeric zymogen has a molecular weight of 45,000 and has an amino-acid composition similar to procarboxypeptidases B of other species. The amino-acid sequence of the amino-terminal portion of procarboxypeptidase is Glu-Pro-Thr-Pro-Arg-Ser-Phe-Asn-Gly-Asp-Lys-Val-Phe-Arg-Val. The zymogen shows intrinsic peptidase and esterase activities that increase markedly by activation with trypsin. The activation reaction proceeds via an intermediate. Carboxypeptidase B shows extensive similarities to the corresponding bovine, porcine, dogfish, and rat enzymes. The amino-terminal sequence of the carboxypeptidase of the African lungfish is homologous to those of carboxypeptidases A and B of bovine.

[9 figures, 4 tables, 22 references] FTP

0.39 VOLATILE AMINES IN MOUSE BRAIN: A RADIOASSAY WITH PICOGRAM SENSITIVITY

Nixon, Ralph (Department of Neuropathology, Harvard Medical School, Boston, MA 02115)
Analytical Biochemistry 48, No. 2, 460-470 (Aug. 1972)

The volatile amines piperidine and pyrrolidine have potent neuropharmacological properties. The presence of these amines has been demonstrated in brain. Other volatile amines also are found in higher concentrations in brain than in other tissues.

Further study of volatile amines required the development of a more sensitive assay. Current colorimetric techniques were sensitive to 1 µg. of amine; however, certain amines required as much as 20 to 30 g. of tissue for analysis. Thus, analysis of individual brain regions, or the brain of small animals, was not feasible by these methods.

A separation technique and radioassay for volatile amines was developed which is 500 times more sensitive than any available method. The sensitivity limits of this method lie in the picogram range. Pooled brains of three mice were homogenized in cold TCA reagent consisting of trichloroacetic acid containing sodium metabisulfite (NaS_2O_5) and disodium ethylenediaminotetraacetate (EDTA). The homogenate was extracted by means of centrifugation and resuspension. The extract in TCA was steam distilled at pH 11 and the distillate was collected in a solution containing NaS_2O_5 and EDTA. The distillate was dried under reduced pressure, redissolved in ethanol, evaporated, and redissolved in ethanol. The solution was then titrated to pH 7.3. The solution was reacted with the radioactive isotope of 2,4-dinitrofluorobenzene (^{3}H-DNFB) to form radioactive diphenylamine derivatives which were then

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0.39 (9.19) POLYCHLORINATED BIPHENYLS: METABOLIC BEHAVIOR OF PURE ISOMERS IN PIGEONS, RATS, AND BROOK TROUT

Hutzinger, O., D. M. Nash, S. Safe (Atlantic Regional Laboratory, National Research Council of Canada, Halifax, Nova Scotia, Canada), A. S. W. DeFreitas, R. J. Norstrom, D. J. Wildish, and V. Zitko
Science 178, No. 4058, 312-314 (Oct. 20, 1972)

Polychlorinated biphenyls (PCBs) are now known to be widespread pollutants, and they are considered to be resistant to chemical and biological degradation. Reports from previous studies indicated that chemical changes to chlorinated biphenyls were brought about by ultraviolet light; in addition, components of lower chlorine content in PCBs were metabolized by rats, pigeons, and Japanese quail but not by fish.

Experiments were performed on laboratory rats, pigeons, and brook trout to determine species differences in metabolic behavior of commercial PCB preparations.

The preparations included 4-chlorobiphenyl, 4,4'-dichlorobiphenyl, 2,2',5,5'-tetrachlorobiphenyl, and 2,2',4,4',5,5'-hexachlorobiphenyl. Groups of young male rats received intraperitoneally 50 mg. of a PCB per kg. of body weight each day for 3 days. The pigeons received, in capsules, the equivalent of 60 to 100 mg./kg. each day for 3 days. Each brook trout received in a single dose the equivalent of 0.460 to 1.2 g./kg. concealed in chunks of beef liver.

One week from the start of the experiment excreta from the pigeons and rats were collected. The water in which the trout had been kept for 4 days was concentrated to 1 liter. Urine was acid hydrolyzed by refluxing and extracted with

(over)

0.4 (9.19)

RELATION OF TRACE METALS TO HUMAN HEALTH

Schroeder, Henry A. (Dept. of Physiology, Dartmouth Medical School, Hanover, NH 03755), and Dan K. Darrow (Trace Element Laboratory, Dept. of Physiology, Brattleboro, Vt.)
Environmental Affairs 2, No. 1, 222-236 (Spring 1972) (Environmental Law Center, Boston College Law School, Brighton, MA 02135)

The authors review the effects of various trace elements on human health in light of animal industrial consumptions, natural abundances, and changes in experimental animals fed low doses for life.

Fourteen metals and two nonmetals are essential for life or for health of animals; twelve of these are mined in large amounts, are abundant in the earth's crust, and are found in human tissues in sizeable quantities. Most of the metals are not toxic to mammals in ordinary concentrations. Five of these metals occur in low amounts, are consumed industrially in sizeable amounts, occur in the body of man, and are toxic of themselves. Of these five metals, lead and cadmium are prevalent in man. Nine metals show low orders of toxicity and they occur in low amounts in the earth's crust. Eight of the metals have little or no toxicity, and six of these eight are abundant.

The metals in the environment that may be of potential hazard to man are: lead (by far the greatest pollutant), cadmium (influences hypertension and emphysema), nickel (as the carbonyl which is carcinogenic), antimony (is toxic), beryllium (can cause beryllosis), and methyl mercury (is highly toxic). The authors indicate that at present levels of exposure, lead, cadmium, and possibly nickel are potentially hazardous to health.

[48 references] FTP

0.36

BINDING AND ADENOSINE TRIPHOSPHATASE OF FLAGELLAR PROTEINS FROM SEA URCHIN SPERM

Hayashi, Masao, and Sugie Higashi-Fujime (Institute of Molecular Biology, Faculty of Science, Nagoya University, Chikusa-ku, Nagoya, Japan)
Biochemistry 11, No. 16, 2977-2982 (Aug. 1, 1972)

In earlier work, the protein "dynein" was isolated from cilia of Tetrahymena and found to have adenosine triphosphatase (ATPase) activity. (Tetrahymena is a common genus of ciliated protozoa.) [Cilia are short, hairlike living processes, usually numerous, on a protozoan cell. Cilia are capable of beating in unison and producing locomotion. Each cilium consists of two central fibrils (threadlike parts of a cell) surrounded by a ring of nine fibrils which are enveloped in a thin membrane. Abstractor's note]

Dynein was identified as the arm projecting on the outer fibril of cilia and found to rebind specifically to the outer fibril. Cilia which rebound dynein showed the superprecipitationlike phenomenon by the addition of ATP. The authors suggest that the biochemical analysis of the interaction between dynein and the outer fibril will give the basis for understanding the mechanism of beating of cilia and flagella. Studies were performed with this viewpoint, using flagella from sea urchin sperm.

Results indicated that solubilized dynein can rebind to the outer fibrils. When binding occurs, the ATPase activity of dynein is characteristically changed. There are differences between free dynein and bound dynein on the K^+ ion dependence of Ca-activated ATPase and the inhibition by the substrate ATP. The authors suggest that this activity corresponds to the effect of F-actin on the ATPase activity of myosin A from muscle and plasmodium.

[9 figures, 1 table, 18 references] SW

0.39 (9.19)

ether. Feces from the rats were extracted with hexane. Pigeon excreta was hydrolyzed and extracted. The liter of trout water was acidified, refluxed, and extracted with ether.

By means of thin layer and gas chromatography and mass spectrometry samples of excreta extracts were analyzed. The results showed that mammalian metabolism (through hydroxylation) of chlorobiphenyls becomes more difficult as the number of chlorine atoms increased in the molecule; that is, 4-chloro-, 4,4′-dichloro, and 2,2′,5,5′-tetrachlorobiphenyl isomers were converted to mono and dihydroxylated derivatives by the rat, but no hydroxylated products of the hexachlorobiphenyl (2,2′,4,4′,5,5′) were detected. Pigeon metabolism of these compounds was similar except that no dihydroxychlorobiphenyl was found in excreta from birds fed 4-chlorobiphenyl. There was no evidence that brook trout had metabolized PCBs by hydroxylation.

[1 figure, 1 table, 9 references] SW

0.39 TRYPSIN-PLASMIN INHIBITORS FROM LEECHES. ISOLATION, AMINO ACID COMPOSITION, INHIBITORY CHARACTERISTICS

Fritz, Hans, Maria Gebhardt, Renate Meister, and Edwin Fink (Inst. Klin. Chem., Univ. Muenchen, Munich, Germany)
Chemical Abstracts 76, No. 9, 43315t (Feb. 28, 1972)

0.35 (2.02) A SIMPLE METHOD FOR FOLLOWING RIGOR MORTIS DEVELOPMENT IN BEEF AND POULTRY MEAT

Kahn, A. W., and A. R. Frey
Can. Inst. Fd Technol. J. 4, No. 4, 139-142 (1971)
BFMIRA Abstracts 25, No. 3, Abstract No. 769, 157 (Mar. 1972)

The method described is based on the measurement of postmortem conversion of adenosine nucleotides to inositic acid, and involves calculation of a ratio of absorbance at 258mμ to that at 250 mμ which changes linearly with the ratio of adenosine and inosine nucleotides. The method is said to be suitable for routine determination of the onset of rigor mortis and to have the advantages of being accurate but simple enough to allow analysis of a large number of samples. S.M.S.

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0.39

separated by thin-layer chromatography. The material on the delimited spots was scraped into scintillator vials. Scintillation fluid was added, the vials were shaken, and counting was carried out. Standard amine curves were constructed and concentrations of amines in experimental samples were determined from the curves.

The method has been used to measure the concentration of seven volatile amines simultaneously from samples of treated mouse brain.

[2 figures, 3 tables, 21 references] SW

0.4
(1.82)

PHAGOCYTOSIS IN INVERTEBRATES. II. THE CLEARANCE OF CARBON PARTICLES BY THE CLAM TRIDACNA MAXIMA

Reade, Peter, and Ene Reade (Dept. of Dental Medicine and Surgery and Dept. of Microbiology, University of Melbourne, Parkville, Victoria, Australia, 3052)
Journal of the Reticuloendothelial Society 12, No. 4, 349-360 (Oct. 1972)

In the vertebrates immunoglobins function, at least toward particulate antigens, as opsonins, for the purpose of facilitating uptake of foreign material by macrophages. These cells engulf and most often digest the foreign material, destroying susceptible microorganisms and stimulating lymphocytes to increased production of specific immunoglobins.

Proteins displaying some of the properties of antibody, such as hemagglutination, do occur in the hemolymph of invertebrates, including molluscs, and some of these exhibit high specificity. Characterization of these proteins, however, show that they are structurally different from mammalian immunoglobins.

Invertebrate animals appear to rely on macrophages without the extra refinement of a lymphoid system and its immunoglobin products. The authors report a suggestion from earlier work that as yet unidentified humoral factors in invertebrates may act as finely descriminating recognition factors.

The clam T. maxima, a coral attached bivalve of the Great Barrier Reef, was examined for the presence of phagocytic cells with the ability to engulf intravascularly distributed carbon particles. By histological techniques it was demonstrated that the particles spread rapidly through the circulatory system. It was also demonstrated that the phagocytic cells, circulating in the hemolymph, were exclusively responsible for the uptake of the particles and their eventual

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0.5
(9.19)

SALMONELLAE AND EDWARDSIELLA TARDA IN GULL FECES: A SOURCE OF CONTAMINATION IN FISH PROCESSING PLANTS

Berg, R. W., and A. W. Anderson (Dept. of Microbiology, Oregon State University, Corvallis, OR 97331)
Applied Microbiology 24, No. 3, 501-503 (Sept. 1972)

The incidence for human salmonellosis from foods is usually associated with foods of animal origin. Fish meal has been implicated as a source of Salmonella; however, fish products prepared for human consumption appear to be less of a problem than products prepared for animal feed. The purpose of the present study was to determine the importance of gulls as a reservoir of and potential source of infection by Salmonella and E. tarda in seafood and fishmeal processing plants. E. tarda is capable of producing disease patterns similar to those caused by Salmonella. Five hundred and twenty-one fecal specimens were obtained from various areas along the Oregon coast.

Of the 521 gull fecal samples, 13 (2.5%) contained Salmonella (2.1%) or E. tarda (0.4%). None of the areas sampled had a high infection rate. However, the organisms showed wide distribution along the coast of Oregon, and this indicates that they may have a role in the epidemiology of salmonellosis.

[1 table, 12 references]

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(8.8)

BACTERIOLOGICAL QUALITY AND OCCURRENCE OF VIBRIOS IN DUNGENESS CRABMEAT IN OREGON PROCESSING PLANTS AND MARKETS

Allen, Evelyn C. (Clatsop Community College, Astoria, OR 97103), and Margy Woodburn (Dept. of Foods and Nutrition and Home Economics Research, Oregon State university, Corvallis, OR 97331)
Journal of Milk and Food Technology 35, No. 9, 540-543 (Sept. 1972)

Food microbiologists and public health officials have become interested in Vibrio parahaemolyticus as a cause of food poisoning. In Japan, it causes 40 to 70% of all bacterial outbreaks of food poisoning. It was identified as the cause in a Maryland outbreak in 1971. Results of other work indicated that V. parahaemolyticus was found in fish and shellfish in Japan, in shellfish along the Atlantic coast, and in shellfish from Bellingham Bay in Washington State.

Crab samples from Oregon retail markets and from various points along crab processing lines of Oregon packers were analyzed to determine the occurrence of the organism. Numbers of fecal streptococci and aerobic total plate counts were also obtained to assess the bacteriological quality of the crabmeat.

Of 106 samples from either source only one, a raw sample, gave an isolate which biochemically resembled V. parahaemolyticus. Eight other isolates were positive for other halophilic vibrios.

Fecal streptococci in crabmeat from processors and retail markets were generally within the guideline of less than 1,000 organisms per gram of crabmeat. The median aerobic total plant count of 1.2×10^6 organisms per gram of samples

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0.5

VIBRIO PARAHAEMOLYTICUS GASTROENTERITIS IN MARYLAND: LABORATORY ASPECTS

Molenda, John R., William G. Johnson, Morris Fishbein, Barry Wentz, Ira J. Mehlman, and Thoburn A. Dadisman, Jr. (Laboratory and Research Administration, Maryland State Dept. of Health and Mental Hygiene, Baltimore, MD 21218; Division of Microbiology, FDA, Washington, DC 20201; and Field Service Branch, Epidemiology Program, Center for Disease Control, Atlanta, GA 30333)
Applied Microbiology 24, No. 3, 444-448 (Sept. 1972)

Three food-associated outbreaks of gastroenteritis occurred in Maryland in September 1971. Apparently two outbreaks involved steamed crabs and one involved crab salad. Laboratory data on the isolation and identification of V. parahaemolyticus from the persons and foods involved in these outbreaks are described in this article. The results reported constitute the first confirmed foodborne epidemics due to V. parahaemolyticus in the United States. This paper also describes the methods for the isolation and identification of the organism and includes a procedure for the simple conversion of conventional laboratory media into suitable culture media for this facultatively halophilic organism.

[1 table, 29 references]

FTP

0.5 (8.8)

from retail markets was above the limit of 100,000 established by New York City and used elsewhere. The plate count of to-be-packed crabmeat remained within this limit.
[2 tables, 19 references] SW

0.5 INCORPORATION OF [^{14}C]AMINO-ACIDS BY A FISH PATHOGEN, AEROMONAS SALMONICIDA

Shieh, H. S., and B. H. Reddy (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
International Journal of Biochemistry 3, No. 14, 167-170 (Apr. 1972)

The causative agent of furunculosis in salmonids is A. salmonicida. It has caused severe losses in salmonid stocks throughout North America and Europe.

The organism requires arginine for growth; experiments were performed to determine the role of arginine in its nutrition.

The omission of arginine from the chemically defined medium results in an almost complete absence of growth of A. salmonicida. Addition of arginine to an incubation medium containing ^{14}C-labeled amino acids caused incorporation of ^{14}C into the cell protein fraction at a rate which was two to three times more than in the absence of arginine. The authors suggest that the stimulatory role of arginine in nutrition of the organism is that of an energy source.
[2 tables, 19 references] SW

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4 (1.82)

limination by cellular migration across epithelial barriers. The migrating cells ontaining the carbon particles, once through the epithelium, are then eliminated o the outside via the exhalant siphon.

The authors suggest that the macrophages of invertebrates also produce their wn recognition substances, which can be detected free in their hemolymph. The dentity and source of these substances are not known.
5 figures, 19 references] SW

0.5 INFLUENCE OF SALTS ON THE VIBRIOSTATIC ACTION OF 2,4-DIAMINO-6,7-DIISOPROPYL PTERIDINE

Merkel, Joseph R. (Dep. Chem., Lehigh Univ., Bethlehem, Pa.)
Chemical Abstracts 76, No. 23, 136296c (June 5, 1972)

0.5 INDUCIBLE PHAGE TAIL-LIKE PARTICLES OF CLOSTRIDIUM SACCHAROPERBUTYLACETONICUM AND ITS RELATED STRAINS

Ogata, Seiya, Osamu Mihara, Yoshifumi Ikeda, and Motoyoshi Hongo (Laboratory of Applied Microbiology, Dept. of Agricultural Chemistry, Kyushu University, Fukuoka, Japan)
Agricultural and Biological Chemistry 36, No. 8, 1413-1421 (Aug. 1972)

Bacteriocins are bacteriocidal agents produced by many species of bacteria. They are divided into two groups: one, low molecular weight; the other, high. The high molecular weight group is sedimentable and visible in the electron microscope as phagelike particles. Experiments were performed on the induction, isolation, and morphology of these substances, and the isolation of bacteria that were sensitive to them.

The results of the experiments indicated that two new kinds of high molecular bacteriocin, named O and M, were found in C. saccharoperbutylacetonicum and its related strains. Production of both substances was inducible by mitomycin C (MC) or ultraviolet light. The clostocins appeared in the bacterial cells at about 105 min. after MC treatment, increased rapidly during the next 75 min. and were released into the medium upon cell lysis. The lysis of O and M producing cells was observed at 3.5 hr. and 4 hr., respectively, after MC treatment.

Clostocin O killed M-producing strains, and clostocin M killed O-producing strains. Electron microscopic observation showed that these clostocins were phage taillike particles with a contractile sheath around a core. The particles resembled some pyocins and also resembled the tail of phage HM 3 of C. saccharoperbutylacetonicum. In addition, M-producing strains of the organism had the ability to produce low molecular weight bacteriocin named clostocin D.
[9 figures, 4 tables, 30 references] SW

0.5 (9.19) ENVIRONMENTAL FACTORS CORRELATED WITH SIZE OF BACTERIAL POPULATIONS IN A POLLUTED STREAM

Brasfeild, Helen (Biology Dept., New Mexico Highlands University, Las Vegas, NM 87701)
Applied Microbiology 24, No. 3, 349-352 (Sept. 1972)

The purpose of this study was to examine the quantitative correlation, if any, between the bacterial quality of a stream and its chemical and physical parameters. Specifically, the author attempted to test the hypothesis that the numbers of bacteria (total, coliforms, and fecal streptococci) in a stream are correlated positively with the temperature, pH, levels of detergents, nitrate plus nitrite nitrogen, sulfate, chloride, bicarbonate, and phosphate.

The Gallinas River, San Miguel County, N. Mex., was selected as the test stream. Analyses were performed on samples of water taken twice weekly--March 12 through July 2, 1971--from a polluted zone of the river.

Log total bacteria correlated positively with levels of bicarbonate, phosphate, and detergent. Log coliform counts correlated positively with levels of phosphate and sulfate, but correlated negatively with levels of chloride. Log fecal streptococci counts correlated positively with concentrations of bicarbonate and chloride. Additional basic studies are needed for a more complete understanding of the problems, but these data do indicate the direction for future research. [2 tables, 14 references] FTP

0.6
(0.5)

CONTROL OF CLOSTRIDIUM BOTULINUM AND STAPHYLOCOCCUS AUREUS IN SEMI-PRESERVED MEAT PRODUCTS

Riemann, Hans, W. H. Lee, and C. Genigeorgis (Dept. of Epidemiology and Preventive Medicine, School of Veterinary Medicine, University of California, Davis, CA 95616)
Journal of Milk and Food Technology 35, No. 9, 514-523 (Sept. 1972)

Mildly processed cured meat products are frequently involved in food poisoning, the causative agent often being S. aureus, which can grow in a salt-containing environment. Other agents of food poisoning such as Salmonella, C. perfringens, and C. botulinum are seldom involved in poisoning due to ingestion of semi-preserved meat. C. botulinum can grow in incompletely preserved products and produce a toxin that causes a high mortality rate. Since even small outbreaks cause great alarm, food processing and distribution must be designed to exclude growth of this organism. The authors summarized a number of studies on botulinogenic foods, including semipreserved meat products.

C. botulinum and S. aureus are naturally occurring contaminants in semipreserved meat products. The organisms can be inhibited by storage below 3° C., 10% sodium chloride, pH values below 4.5, or proper combinations of these factors. Most meat products do not have the low pH and brine concentration required to inhibit, and there is always the risk of temperature abuse.

An approach to safety is to add, together with glucose, a radiation-killed preparation of lactic acid bacteria, such as Pediococcus cerevisiae. Such preparations cause a rapid decline in pH only when the product is exposed to high temperature; they are otherwise stable in the conditions found in meat storage.

(over)

0.6
(0.8)

NUTRITIONAL CHARACTERISTICS OF MARINE FOOD FISH CARCASS WASTE AND MACHINE-SEPARATED FLESH

Crawford, David L., Duncan K. Law, and Jerry K. Babbitt (Dept. of Food Science and Technology, Oregon State University, Seafoods Laboratory, Astoria, OR 97103)
Journal of Agricultural and Food Chemistry 20, No. 5, 1048-1051 (Sept.-Oct. 1972)

The carcasses of each of six species of marine food fish were passed through a laboratory model flesh separator. The machine separated the waste into two fractions; flesh and bones-skin. The yields of the two fractions for each species of fish were determined. The proximate composition and mineral (P, K, Ca, Mg, Na, Ca/P, K/Na, Al, Ba, Fe, Sr, B, Cu, Zn, Mn, and Cr) contents of the whole waste, and machine separated flesh and bone-skin were analyzed. Also the PER (protein efficiency ratio) values for the whole carcass waste and the machine separated flesh were determined. The purpose of the study was to find out what yield of fish flesh could be produced from fish carcasses by use of a machine separator and to determine the effect of such machine separation on the composition and nutritional characteristics of the separated fractions. The six species of fish used were English sole, petrale sole, orange rockfish, yellowtail rockfish, true cod, and ling cod.

The yields of fish flesh from the carcass wastes ranged from 48.9% to 60.2%; these yields resulted in 43.7% to 55.3% recovery of protein, 42.7% to 66.0% recovery of fat, and 13.3% to 21.6% recovery of ash. The levels of phosphorus, calcium, strontium, manganese, boron, and chromium (generally associated with the bone and skin) were much lower in the recovered flesh fractions as compared to

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1.0116
(1.0117)

FOREIGN FISHING

Fuss, Charles M., Jr. (Southeast Region, National Marine Fisheries Service, NOAA, St. Petersburg, Fla.)
Fish Boat 17, No. 9, 33, 35, 37, 47-48 (Sept. 1972)

Foreign vessels can legally fish off the coasts of the United States 12 miles offshore. U.S. nationals are granted exclusive rights to fish the contiguous sea from 3 miles offshore to 12 miles offshore. Only under certain international agreements are foreign fishing vessels allowed to fish in this zone.

Rapid expansion of foreign fishing off the U.S. coasts has occurred in the last decade. Foreign fishing fleets off the New England and Pacific Northwest coasts are well known and have caused concern. Much less is known about foreign fishing in the Gulf of Mexico and off the coast of the South Atlantic States.

The National Marine Fisheries Service (NMFS) performed a preliminary study to determine the extent of foreign fishing in that area in cooperation with the U.S. Coast Guard and the various state conservation agencies. The need for a permanent surveillance program was demonstrated by the study and an Enforcement and Surveillance Division was established in the Southeast Region of the NMFS in 1971. The area covered includes the Atlantic coastal waters from the mouth of Chesapeake Bay south and Gulf coastal waters from Florida to the Mexican border.

Personnel of the NMFS observed 386 individual foreign fishing vessels fishing in the area between October 1970 and October 1971. The vessels were from the U.S.S.R., Cuba, Mexico, Japan, East Germany, Bulgaria, Poland, and Spain. Of this total, 241 vessels were fishing in the Atlantic Ocean and the remainder in the

(over)

1.0146
(1.69)

THE MOVEMENTS OF TAGGED ADULT PLAICE IN THE IRISH SEA

Macer, C. T. (Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, England)
Fishery Investigations, Series II, 27, No. 6, i-v, 35 pp. (1972). London, England Her Majesty's Stationary Office £1.05.

As a result of earlier work it is now known that the main spawning areas of plaice are off St. Bees Head, off Douglas (Isle of Man), off Great Ormes Head (North Wales), in Caernarvon Bay, and in the Bristol Channel.

Although movements of plaice in the Irish Sea were known, more information was needed to determine whether hatchery plaice would remain in the area where they were released. A total of 16,771 plaice (measuring 18 to 40 cm.) were tagged and released off the following areas: St. Bees Head (Cumberland), Great Ormes Head, Red Wharf Bay (North Wales), Caernarvon Bay, Cardigan Bay, and Bristol Channel. The mean recapture rate was 28%. Plaice in spawning condition that had been released off St. Bees Head, and Great Ormes Head mostly returned to the same area to spawn each year. Although they dispersed throughout the northeast Irish Sea after spawning, very few were recaptured outside this region.

Half the recaptures from a mixed population of tagged mature and immature plaice released in Red Wharf Bay in autumn were from outside the northeast Irish Sea, and they showed a marked tendency to migrate southwards.

There was evidence of homing at spawning time among plaice released on the spawning grounds in Cardigan Bay and the Bristol Channel, and for a predominantly

(over)

0.6 (0.8)

the carcass wastes. The levels of potassium, sodium, and iron were higher in the flesh fractions than the carcass wastes; but the calcium/phosphorus and potassium/sodium ratios were lower in the flesh fractions. The PER values for the flesh fractions were significantly higher than that of the carcass wastes.
[4 tables, 15 references] FTP

1.01 ATLAS OF THE LIVING RESOURCES OF THE SEAS

Prepared by the Dept. of Fisheries, Food and Agriculture Organization of the United Nations; via delle Terme di Caracalla, Rome, Italy (1972), viii + 19 pp. + 52 maps. Price not stated.

This atlas was prepared at the request of the United Nations Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction. It depicts the living resources of the seas on a worldwide scale. Ten maps illustrate the geographical distribution and present state of exploitation of the resources living in the world's oceans. Seven maps show some characteristics of fish migration. Forty-five regional maps illustrate the geographical and vertical distribution and abundance of the main stocks of living resources in each ocean region. FTP

1.0146 (1.69)

northwards dispersal after spawning. There was no common migration pattern shown by plaice tagged outside the spawning season in Caernarvon and Cardigan Bays, but the predominant direction of movement was normally southwards. There were recaptures in the western English Channel from all release areas but there appeared to be very little return movement.
[12 figures, 13 tables, 17 references] SW

(Addition of irradiated lactic acid bacteria to meat products has not yet been approved.)

Another way to improve safety of semipreserved meat is to add just enough glucono-delta-lactone to reduce the initial pH to a level at which the salt concentration is inhibitory. Larger amounts may result in flavor and color problems.
5 figures, 1 table, 106 references] SW

.6 (0.5)

0.7 (7.594) THE LIMITATIONS OF WHOLE TISSUE ANALYSIS TO DEFINE LINOLENIC ACID DEFICIENCY

Crawford, M. A., and A. J. Sinclair (Nuffield Institute of Comparative Medicine, The Zoological Society of London, Regents Park, London, N.W.1, England) Journal of Nutrition 102, No. 10, 1315-1321 (Oct. 1972)

It has been claimed on the basis of a deficient diet and on whole head, liver and heart analysis, that linolenic acid is not essential to the rat (J. Nutr. 101: 937, 1971). The present studies show that the methodology was inadequate to support this conclusion. Analytical data are presented which illustrate the principle that whole tissue analysis need not define the content of linolenic acid metabolites in cell membrane phosphoglycerides. In particular, rat brain ethanolamine phosphoglycerides (EPG) contained 22% of their fatty acids as C22:6,n-3 but the contribution of brain EPG to the total head lipid was only 1.5%. It was estimated that analysis of total head fatty acids could not be used as evidence of deficiency of linolenate metabolites in brain EPG.
[3 tables, 22 references] Authors' abstract

0.6 AMOUNT AND COMPOSITION OF THE DRIP LIQUID FORMED DURING HEAT TREATMENT OF SARDINES AND TUNA AND POSSIBILITY OF ITS USE

Perović, V., and M. Knezević (Centar Ribu Privredu Mediterana, Prehrambeno-Tehnološki Inst., Zadar, Yugoslavia)
Chemical Abstracts 76, No. 25, 152157d (June 19, 1972)

1.0116 (1.0117)

Gulf of Mexico. An estimated 100 million pounds of fish and shrimp were caught with a value of $7 million. The principal catch in the Atlantic Ocean was of mackerel and herring; in the Gulf of Mexico, the catch consisted of higher value shrimp, snapper, and tuna.

The Soviet Bloc fishing effort is an extension of the current herring and mackerel fishery that began off New England in 1961.

Japanese longliners were observed fishing mainly for albacore tuna off the North Carolina coast. They remained for 10 days and fished from 21 to 85 nautical miles offshore. The Japanese fish under an agreement achieved at the Rio Conference on Tuna in 1966. An informal understanding exists in which the Japanese remain a circumspect distance from areas of interest to U.S. sport fishermen.

Cuban fishing efforts in the eastern Gulf have increased; they fish for snappers and groupers. Cubans trawl for shrimp on the Tortugas grounds.

Japanese longliners fish for tuna in the north and western Gulf. The informal agreement of the Rio Conference also applies to this area.

Reports indicated that 50 to 200 Mexican shrimp trawlers were operating off the coast. Mexican fishermen are allowed to fish in the outer 3 miles of the U.S. contiguous zone under terms of a fishery agreement in force from January 1968 to January 1973.
[4 photographs] SW

1.89 (1.0114) SEA URCHINS: A NEW FISHERY DEVELOPS IN CALIFORNIA

Kato, Susumu (Tiburon Fisheries Laboratory, National Marine Fisheries Service, Tiburon, CA 94920)
Marine Fisheries Review 34, Nos. 9-10, 23-30 (Sept.-Oct. 1972) (formerly Commercial Fisheries Review; 3300 Whitehaven St., N.W., Washington, DC 20007)

In southern California, large numbers of sea urchins have long plagued the marine plant and animal community. Researchers have found a direct cause-and-effect relationship between the superabundance of sea urchins and the failure of underwater plants to proliferate. Sea urchins feed on seaweed and young kelp and sometimes even destroy mature kelp by feeding on the "hold fasts" that anchor them to the bottom.

Kelp and other seaweeds provide food and shelter for many species of invertebrates and fishes, and marine anglers take advantage of the concentrations of game fish often found in densely forested kelp beds. In addition to their ecological importance, kelp is a useful ingredient in a wide variety of industrial products, such as ice cream, beer, antibiotics, dyes, and welding rods. In California, about 150,000 tons of kelp are harvested annually.

Because of the harmful effect of sea urchins on kelp and, indirectly, on fishes and invertebrates, researchers started an eradication program several years ago to control sea urchin populations. Soon kelp harvesters and sport fishermen joined in the effort to destroy sea urchins. The eradication program appears to have resulted in speedy restoration of some kelp beds in southern California that had been in poor condition.

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2.1128 (2.1478) SCALLOP DREDGING GEAR AND METHODS

Hughes, W. D. (Dept. of Primary Industry, Canberra, Australia)
Australian Fisheries 31, No. 7, 12-15 (July 1972)

Presently all the States of Australia conduct scallop fishing, but Victoria is preeminent. Therefore the various methods and types of gear employed in scallop dredging in the Victoria area are surveyed.

Boats vary from 30 to 69 ft. in length and from 70 to 200 hp. in engine size. Wheelhouses may be either forward or aft, however the aft position is quite inconvenient. There is little uniformity in boat design since many of them were originally employed in other fisheries. The one item all scallop boats have in common is a dredge self-tipping device mounted on the stern. This tips the dredge up at an angle as it comes on board the boat and forces it to empty itself with little or no assistance from the crew.

Most winches were found to be modified heavy truck differentials; some with two speeds. Occasionally, two drums are used and arranged so that one can be locked while the other is free running. Dredge hauling speed varies between 100 and 200 ft. per minute.

Warp size is usually 1-1/4 in., 1-1/2 in., or 1-3/4 in. in circumference. They are usually 6 strand, 24 SWG wire. Most boats carry approximately 120 fathoms of warp on the drum and use a minimum 4:1 water depth to warp length ratio.

The typical dredge is sled type, 7 to 11 ft. wide and weighing 250 to 600 lb. Some dredges have a tooth bar on them where the teeth protrude about 2 in. below the skids and are set at an angle of 35° to 40°. The tooth bar is added depending on type of bottom and to increase efficiency.

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2.1121 A MIDWATER TRAWL FOR THREADFIN SHAD, DOROSOMA PETENENSE

Von Geldern, C. E., Jr. (Inland Fisheries Branch, California Dept. of Fish and Game)
California Fish and Game 58, No. 4, 268-276 (Oct. 1972)

A study was undertaken in 1965 at Lake Nacimiento, San Luis Obispo County, Calif., to evaluate the effects of an experimental introduction of threadfin shad on the existing warm water fishery. Of major concern was the need for an efficient method of sampling shad populations in the pelagic areas of the lake. The lake covers 5,300 acres and has an unusually irregular shoreline, many long arms, sunken islands, and peninsulas which create hazards to midwater trawl operations. The need was for a trawl with the following basic features: (1) it must be of double warp design; (2) it must have rapid dive capability; (3) it must not require the addition of supplementary otterboards or diving doors at any point along the bridles or towing warps.

A net was constructed of this design with the following features: The net is double warp, 10 x 10 x 50 ft., to which are attached two hydrofoils and two depressors. The hydrofoils are at the top and to the sides of the net mouth; the two depressors are at the bottom and to the sides of the net mouth. Two towing warps and bridles are used. One bridle is attached to the right side hydrofoil and depressor, the other bridle is attached to the left side hydrofoil and depressor.

To set the net, the depressors and hydrofoils are arranged on the afterdeck for easy access. While the boat travels about 1 m.p.h., the net is cast out between depressors and then, when net is completely out, depressors and hydrofoils

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2.116 (2.146) ACOUSTIC TECHNIQUES FOR ESTIMATING FISH ABUNDANCE

Ehrenberg, J. E., and D. W. Lytle (University of Washington, Seattle, WA 98105)
IEEE Transactions on Geoscience Electronics GE-10, No. 3, 138-145 (July 1972)

Echo counting and echo integration are two acoustic techniques for estimating the abundance of fish.

The principal shortcomings of the echo-counter is its inability to give an accurate estimate in high fish densities. When two or more fish are separated in depth by an amount less than the depth corresponding to the length of a single pulse, their echoes overlap and only a single count is recorded. However, at low densities the echoes from individual fish do not overlap; the echo counter has a lower error than the echo integrator. The performance of the echo counter deteriorates with increasing fish density.

The echo integrator provides an accurate estimate of fish population provided the mean target strength of a single fish can be accurately estimated. The performance of the echo integrator improves with increasing fish density. The problems of long-term stability and accuracy in echo integration systems can be reduced by digitally processing the data.

The choice of acoustic equipment should be based on the characteristics of the fish population to be surveyed. If the fish density is low, echo counting is the best technique. If the density is high echo integration should be used.

The authors presented mathematical models of both systems. In addition, expressions for the mean squared errors of the abundance estimates taken from each system were obtained.

[5 figures, 4 references] SW

2.1121

are placed in the water. The boat is accelerated to 3 m.p.h., the net is inspected for proper fishing, then the towing warp is let out to the desired length.

To retrieve the net, the towing warp is taken in, the hydrofoils are hauled in with depressors, and the net is pulled in directly over the stern. The boat should be traveling at 3 m.p.h. until the hydrofoils and depressors approach the boat's stern. Then the boat is decelerated to 1 m.p.h. until the net is retrieved.

Adding floats and weights to the hydrofoils and depressors, respectively, eliminates the need for supplementary doors to spread the net. The net dives rapidly (reached a depth of 55 ft. towed at 3 m.p.h. with 200 ft. of towing warp out), but can be modified for situations not requiring rapid diving. Throughout the fishing trials, tangling or fouling of the gear never presented a serious problem. [8 figures, 1 table, 7 references] Lee Thorson

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2.116 HIGH SPEED SCANNING SONAR
(2.146)

Haines, Gregory
World Fishing 21, No. 8, 43, 73 (Aug. 1972)

A high-speed scanning sonar has been designed by the Industrial Development Board of the Canadian Fisheries Service. This type of sonar displays in picture fashion details of surface and bottom with position of net and fish to be netted.

The sonar system was designed to satisfy the following operational requirements: (1) capable of detecting a 5-ton school of herring, approximate volume 12,000 cu.ft.; (2) detection range of 6,000 ft. minimum at 50% probability; (3) capable of use in water with ice conditions; (4) capable of distinguishing otter boards when placed 80 ft. apart at 300 ft. range; (5) capable of distinguishing otter boards from the head and footropes of a trawl; (6) surveillance through 360°; and (7) operation in waters greater than 50 fathoms depth.

The system has potential use as a research tool in acoustic experiments and in fishery research.
[2 diagrams, 1 photograph] MS

2.3 ROE EXTRACTION

Nordischer Maschinenbau Baader (pat.)
German Patent 2,060,237
Food Technology 26, No. 11, 127 (Nov. 1972)

A fish flank is sliced. As a result, the belly flap drops exposing the roe for removal by a mechanical scraper. FTP

2.3 TEMPEH FOODSTUFF

Gyorgy, P. (pat.)
U.S. Patent 3,681,085
Food Technology 26, No. 11, 127 (Nov. 1972)

Fish pieces and tempeh are mixed, then sterilized, to form an edible food product. FTP

1.89 (1.0114)

In Japan, sea urchins are protected rather than destroyed. A complex system of regulations, imposed by government and by fishery cooperatives, limits the numbers and areas open to harvesting and on harvesting methods. In addition, artificial reefs have been created in many areas to provide suitable habitat for sea urchins (Matsui, 1966). The sea urchins are prized for their roe, which is eaten in Japan and in many European and South American countries.

The chief use is in restaurants that specialize in "sushi," a canape made with a small ball of vinegar-flavored rice, and topped with cooked, raw, or pickled seafood. When sea urchin is used, the rice ball is partially covered with seaweed to form a cup, into which the roe is placed. Sea urchin roe is also preserved with salt or alcohol and salt; the preserved roe is often made into a paste, which is eaten with plain rice or mixed with other seafood products, such as fishcake and jellyfish.

The National Marine Fisheries Service is promoting the utilization of sea urchin roe. The author describes the operations involved in the developing California fishery for sea urchins. A fishery for the domestic market is now firmly established.
[8 figures, 6 references] Reprinted in part

2.1128 (2.1478)

The boats usually operate in a small area and employ intensive fishing efforts. The dredges are hauled at 10- to 30-min. intervals, depending on catch. Once aboard, the scallops are sorted and measured for size and placed in jute bags or drums for later bagging.
[8 figures] Abstractor: Lee Thorson

2.1121 MAKING AND MENDING NETS. PART II

Buckingham, Harry
World Fishing 21, No. 8, 51, 53 (Aug. 1972)

The largest trawling companies ensure that their trawlers carry a good supply of spare parts for damaged nets. The smaller skipper-owners may try to economize and become short on parts to repair their nets. The result can be reduced earning caused by lost fishing time.

The trawler should carry such spares as shooters, belly and batings, square and wings, and cod ends. These parts can be fitted to an existing trawl.

The belly and batings are laced together with reinforced selvages. The square and wings are fitted with the bolsh, ready to fix to the fishing line. The headline on the top wings is complete with quarters and staples. The top and bottom sections are laced at the selvage. For repair of the cod end the upper and lower cod ends are ready laced together.

In the net store, all spare parts should be tied in handy bundles and marked for easy identification so they can be retrieved as quickly as possible when necessary. [3 figures] SW

2.116 HYDROACOUSTIC ASSESSMENT OF LIMNETIC-FEEDING FISHES

Thorne, Richard E. (Fisheries Research Institute, University of Washington, Seattle, WA 98195)
Proceedings Research on Coniferous Forest Ecosystems--A Symposium, Bellingham, Washington, Mar. 23-24, 1972. Washington Sea Grant 72-22, pp. 317-322 (1972) (University of Washington, Sea Grant Program, Seattle, WA 98195)

Determination of the numbers and biomass of limnetic-feeding fishes is essential to assess recruitment, growth, mortality rates, distribution patterns, and interaction with other trophic levels.

Assessing fish population is required in fishery management; techniques based on catch-per-unit effort and tagging have many inadequacies. Catch statistics are of little value in determining fish populations in lake systems since the fisheries are either limited, highly selective, or nonexistent. The problem can be attacked through application of hydroacoustic assessment techniques.

The equipment used on the lake studies includes an echo sounder incorporated into a system in which target data is recorded on magnetic tape.

Echo counting techniques are limited to relatively low fish densities but they can provide data on size distribution of targets. Echo integration techniques relate fish density to integrated target voltage. A combination of both techniques are used. Basic analysis of data is accomplished by integration, but the integrators are calibrated and size information is derived by echo counting.

Echo counts are made by observation of specific depth intervals on an oscilloscope while the tape recording of a transect is played back. Since echo counting from the oscilloscope is time consuming and limited to low-density situations

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2.3 SCALLOP PROCESSING

Willis, E. D. (pat.)
U.S. Patent 3,662,431
Food Technology 26, No. 8, 95 (Aug. 1972)

This is a method for shucking scallops and for separating the muscle from the viscera. FTP

2.3 HOW TO SELECT SANITARY FLOORING. PART II.

Beauchner, Frank R., and Donald G. Reinert (Atlas Minerals & Chemicals Div., ESB Inc., Mertztown, PA 19539)
Food Engineering 44, No. 10, 120, 122, 126 (Oct. 1972)

Part I of this article described "Chemical Proof" floors commonly used in food industry plants: protective coatings, monolithic surfacings, and metal-plate floors. Another type of floor, the tile or paver, was described in this part II.

The tile floor is the most durable and versatile, and the authors suggest, the most attractive type available to the food industry.

In areas of light traffic, quarry tile of 1/2- or 3/4-in. thickness should be used. Paver of 1-3/16-in. thickness can be used in most areas of the food plant. In heavy load areas or areas subject to extreme thermal shock, thicker brick or tile should be used to take excessive loads or dissipate heat.

The "resin-cement bed" system is a method for installing the tile. Depending on thickness of tile, method of installation, size of installation, and amount of cutting required for drains or pads, cost varies from $2.75 to $4.00 per square foot. The bedding material must be compatible with the finished concrete slab below, and it must adhere to the slab and the tile above. The tile is either buttered in place or set in the bed for grouting. Expansion joints are required. This system is a complete chemicalproof flooring. The tile, and the bed or grout are inert and will not be damaged by corrosives spilled on the floor.

Another flooring system is the "sand-cement bed." A waterproof membrane is applied over the structural slab. Then a conventional sand-cement bed is placed on the membrane. Tile is set into the bed joints left open for grouting. The

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2.3 FISH PROCESSING

Uekusa, H.; Toyo Seikan Kaisha Ltd. (pat.)
U.S. Patent 3,665,557
Food Technology 26, No. 8, 96 (Aug. 1972)

This apparatus separates and removes the red (dark) meat from the white meat of split fish sections. FTP

2.3

sand-cement bed can vary in thickness from 1 to 1-1/2 in. Expansion joints should be used in this system also. Cost of installing this floor ranges between $2.25 and $3.00 per square foot.

In the membrane construction method, a glass cloth reinforcing is installed as part of an asphalt paving applied hot in four to six applications, building up to 1/4 in. Thickness of tile should be less than 1-3/16 in. in this system. A 1/8-in. bed joint of resin cement is applied directly on the membrane, and the tile is then buttered with the resin cement and layed in the bed. Expansion joints are also required for this system. This floor is particularly suited for excessively wet areas. It is chemically inert. Cost of this floor ranges between $3.50 and $4.50 per square foot.

Expansion joints must be considered as a maintenance point in the floor because they are not as durable as the floor. They must be inspected and repaired as required.

Brick pavers and tile are available with aluminum oxide surfaces to prevent sliding. Nonskid coatings such as aluminum oxide or silica can be spread over the floor before curing is complete. Nonskid surfaces should be considered for installation in excessively wet areas to reduce safety hazards.
[2 photographs, 3 diagrams] SW

2.3 SHRIMP PEELER

Matriesun, E. H. (pat.)
British Patent 1,275,314
Food Technology 26, No. 10, 101 (Oct. 1972)

This shrimp peeler cuts the heads of the shrimp. FTP

2.3 SHELLFISH EVISCERATION

Wenstrom, R. T., and T. S. Gorton; Slade Gorton & Co., Inc. (pat.)
U.S. Patent 3,665,554
Food Technology 26, No. 8, 95 (Aug. 1972)

Shellfish are treated with lactic acid and salt, then heated at 40°-90° C. until semicooked and the flesh is easily removed from the shell. FTP

2.3 SHELLFISH PROCESSING

Daiichi Shoji KK (pat.)
Japanese Patent 22260/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Bivalve shellfish are shucked, then the viscera are removed from the edible muscle. FTP

2.3 SCALLOP PROCESSING

Willis, E. D.; Willis Bros. Inc. (pat.)
U.S. Patent 3,665,555
Food Technology 26, No. 8, 95 (Aug. 1972)

The apparatus is used to shuck scallops and to remove the viscera from the edible muscle. FTP

2.3 TUNA PROCESSING

Lapeyre, J. M. (pat.)
Canadian Patent 906,309
Food Technology 26, No. 11, 127 (Nov. 1972)

Whole frozen tuna fish are sliced transversely into sections of uniform thickness then the sections are selectively graded prior to canning. FTP

2.116

basic data processing is done by echo integration. A system called Digital Data Acquisition and Processing System (DDAPS) integrates voltages from fish targets within several depth intervals simultaneously and calculates the fish abundance using input calibration and target strength data.

Typically the average target strength is not known precisely before processing; the density outputs of DDAPS are thus relative rather than absolute. Conversion to absolute density can be made either from measurement of target strengths or by direct comparison of DDAPS output with determinations of absolute density by echo counting.

The absolute density is obtained from various depth intervals along the various lake transects. These densities can be extrapolated over the respective volumes represented by the transects to obtain a total estimate of fish within the lake. The species and size composition must be obtained from net samples. It would be a valuable asset to be able to determine the number of larger fish by acoustic methods, however.
[5 figures, 12 references] SW

2.3 FISH PROCESSING

Astra Nutrition, AB (pat.)
German Patent 2,626,545
Food Technology 26, No. 11, 127 (Nov. 1972)

By use of a low temperature process, fish hydrolysates are homogenized and centrifuged to recover protein, fat, nucleotides, and insoluble tissue. FTP

3.15 RADIATION STERILIZATION OF PROTOTYPE MILITARY FOODS: LOW-TEMPERATURE IRRADIATION OF CODFISH CAKE, CORNED BEEF, AND PORK SAUSAGE

Anellis, Abe, D. Berkowitz, W. Swantak, and C. Strojan (Microbiology Division, Food Laboratory, U.S. Army Natick Laboratory, Natick, MA 01760)
Applied Microbiology 24, No. 3, 453-462 (Sept. 1972)

Little information is available on the radiation resistance of Clostridium botulinum spores in codfish cake, corned beef, and pork sausage. This study involved the prototype radiation sterilization process at -30° ± 10° C. for these products using C. botulinum type A and B spores as the index of microbiological safety. Radiation temperature of about -30° ± 10° C. was used because it gave a reasonable balance between sterilizing dose, organoleptic quality, and process costs.

"Screening" packs consisting of 10 lots each of the three products [each lot containing about 10^6 spores of a different strain (5 type A and 5 type B) of C. botulinum per can] were irradiated with a series of doses of ^{60}Co gamma rays. The cans were stored for 3 months at 30° C. and then examined for swelling, toxin, and recoverable botulinal cells. The median lethal dose (LD_{50}) and D values were estimated for each strain of C. botulinum in each food.

The most resistant strain in codfish cake was 53B; in corned beef, 77A; and in pork sausage, 41B [the 10 strains used are described in Appl. Microbiol. 15, 166-177 (1967)]. The two antigenic types of C. botulinum showed no clear-cut

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3.2490 DECOMPOSITION OF TRIMETHYLAMINE OXIDE AND CHANGES IN PROTEIN EXTRACTABILITY DURING FROZEN STORAGE OF MINCED AND INTACT HAKE (MERLUCCIUS PRODUCTUS) MUSCLE

Babbitt, Jerry K., David L. Crawford, and Duncan K. Law (Dept. of Food Science and Technology, Oregon State University, Seafoods Laboratory, Astoria, OR 97103)
Journal of Agricultural and Food Chemistry 20, No. 5, 1052-1054 (Sept.-Oct. 1972)

Recently, various workers isolated an enzyme system from fish and shellfish that reduces trimethylamine oxide (TMAO) to trimethylamine (TMA), dimethylamine (DMA), and formaldehyde. This enzyme system was examined at experimental temperatures of 0° C. and higher, but some evidence seems to indicate that a similar reaction occurs in some fish during frozen storage. The purpose of the present study, thus, was to examine the formation of formaldehyde and the degradation of TMAO in intact muscle and minced muscle of Pacific hake during frozen storage of the samples. In addition, changes in the muscle protein were determined to find out whether the various changes were affected by different packaging methods.

Freshly caught Pacific hake were divided into two groups and thoroughly washed. The first group was filleted, and the fillets were packed in stainless-steel trays and frozen at -30° C. The second group was dressed then passed through a fish separator machine that separated the muscle (and minced it) from the bones and skin. The minced muscle was packed in stainless-steel trays and frozen at -30° C. Both groups of frozen hake were cut into blocks, then air- or vacuum-sealed in moisture vapor-proof pouches or wrapped in polyethylene film.

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3.23 (3.27) VACUUM SYSTEM THAWS FASTER

Everington, D. W. (Clarke-Built Ltd., Thetford, Norfolk, England), and A. Cooper (A.P.V. Co., Ltd., Crawley, Sussex, England)
Food Engineering 44, No. 10, 76-78 (Oct. 1972)

In the food freezing process, moisture in the outer surface layers quickly freezes, causing increased local thermal conductivity. As the freezing proceeds, the frozen zone extends inward, and the heat flow from the center outward increases progressivly as the freeze boundary contracts.

The opposite occurs in thawing. As outer layers thaw, their relative thermal conductivity decreases; thus, heat flow inward is progressively slower. To shorten thaw time, the film coefficient (a measure of the amount of heat flowing across the food surface) must be increased.

In vacuum heat thawing, condensing steam vapor is used to obtain a high surface coefficient. The thawer is a horizontal cylindrical vessel which is loaded with food products to be thawed.

Results of simulated tests of the thawer are as follows: (1) A 10-cm.-thick whole cod block was thawed in 4½ hr. at a vapor temperature of 68°F. No over heating occurred and the fish was firm and easily filleted. (2) Beef blocks, 4 and 9 cm. thick were thawed to a condition suitable for mechanical cutting in 20 and 60 min., respectively. A 1-ton-capacity batch unit thawer occupying 60 sq. m. of floor could thaw 2 tons per hour preparatory to mechanical cutting.

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3.26 (9.2) FRESH FISH SALES AS A FUNCTION OF PROMOTION IN A PORTLAND, OREGON, GROCERY CHAIN

Batie, S. S., and F. J. Smith (Dept. of Agricultural Economics, Oregon State University, Corvallis, OR 97331)
Special Report 372, Agriculture Experiment Station, Oregon State University, Corvallis, OR 97331 (Oct. 1972), 18 pp.

Retail grocers advertise seafood both with and without price discounts; they do not always know which policy results in more profits. This report examines the marketing of three fish items to determine which advertised price policy would result in the largest total revenue from each item.

It is possible that an advertised price discount will not increase sales enough to compensate the grocer for the price reduction. It is also possible that total revenue could rise with an advertised price increase because sales do not decline significantly. A retail grocer will want to know which result he can expect from a given policy.

He therefore requires a measure of the change in total revenue (price multiplied by sales) expected from a change in advertised price; this change can be estimated by determining the advertised price elasticity which is a measure of percentage change in sales that results from a percentage change in advertised price. The behavior of the relation between total revenue and elasticity measurements is as follows: when advertised price elasticity is greater than 1.00 (or elastic), total revenue moves inversely with advertised price changes. As advertised price falls, total revenue rises. As advertised price rises, total revenue falls. When advertised price elasticity is inelastic (less than 1.00),

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3.23 (3.27)

Vacuum thawers come in units in which two processes can be performed sequentially. When thawing is complete, cooking commences as steam is injected into the vessel at 30 p.s.i. After cooking is complete, a vacuum pump evacuates the thawing chamber and rapidly cools the product. The thawer can be manufactured from stainless or carbon steel clad with plastics or stainless steel. The cost per ton of thawing frozen whitefish is calculated to be $5.20.
[2 figures, 2 tables, 1 photograph] SW

3.234 DEEP FREEZING PROBLEMS
(3.24)

Savi, P., and U. Sellerio
Ann. Ist. Sup. Sanita, No. 6, 425-451 (1970) (In Italian)
BFMIRA Abstracts 25, No. 10, Abstract No. 3715, 743 (Oct. 1972)

"Report on the problems in the treatment of deep-frozen foodstuffs, mainly relating to raw materials, treatment, freezing, storage and control. Two method are mentioned for the control and the estimation of the quality of lean and fatt fish, applicable when the thermal history of the product is known, i.e. storage time and process." Reprinted

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rend in comparative order of resistance among the three foods. LD_{50} values and values gave essentially the same order of resistance, and they may be used nterchangeably for the 10 test organisms.

"Clearance" packs of each of the three foods with the most resistant strain about 10^7 spores/can) were irradiated with various dose levels at 30° ± 10° C. 100 replicate cans per dose). Codfish cake was irradiated from 1.0 to 4.5 Mrad, orned beef from 1.0 to 4.0 Mrad, and pork sausage from 0.5 to 3.5 Mrad in units f 0.5 Mrad. The packs were stored at 30° C. for 6 months, then were examined or swelling, presence or C. botulinum toxin, and viable cells. The minimal radiation dose (MRD) for the three products inoculated with spores of the most resistant strain of C. botulinum is shown in the table that follows.

Food product	Strain of C. botulinum	Experimental sterilizing dose (ESD)	Method of estimating 12D dose [1]	
			Exponential distribution	Normal distribution
dfish cake	53B	2.5 ≤ ESD ≤ 3.0	3.24	3.09
rned beef	77A	2.0 ≤ ESD ≤ 2.5	2.44	2.57
rk sausage	41B	1.5 ≤ ESD ≤ 2.0	2.65	2.39

Based on recoverable cells.

Corned beef treated with sublethal doses (0.5, 0.75 Mrad) of irradiation owed increased visible spoilage rate over that of unirradiated controls. It pears that the radiation-injured spores of C. botulinum were sensitive to the esence of food additives (such as curing salts, NaCl, and spices).
figure, 8 tables, 49 references] FTP

3.26 (9.2)

total revenue moves directly with changes in advertised price. As advertised price falls, total revenue also declines, and vice versa. Total revenue is at a maximum where advertised price elasticity is equal to 1.00. It is important to understand that this concept does not incorporate costs; therefore, determination of elasticity will not reveal net revenues resulting from advertising.

Price elasticity of demand is the percentage change in quantity sold that results from a percentage change in price, other things being equal. The quantity sold will increase as result of a price reduction. An increase in quantity sold resulting from successful advertising is called the advertising effect. If the price were also reduced the increase would be called the advertised price effect.

A study was conducted of a 20-store grocery chain in Portland, Ore., with reference to estimated advertised price elasticity of demand. The results indicated that red snapper and sole sales had inelastic advertised price elasticities of demand. Silver salmon sales had elastic advertised price elasticities of demand. The predictions were that shortrun gross revenues would increase if an advertisement for silver salmon included a price discount. Conversely, sole and red snapper sales would have larger gross returns if the advertisements did not include a price discount.
[3 figures, 5 tables, 10 references] SW

3.15 ENZYMIC CHANGES IN IRRADIATED FISH DURING STORAGE AT 0°
(2.03)

Jebsen, J. W., G. Lunde, and B. Underdal (Fiskeridir. Kjemisk-Tek. Forshningsinst., Bergen, Norway)
Chemical Abstracts 77, No. 3, 18232b (July 17, 1972)

3.2490

The samples were stored at -20° C. The samples were removed periodically from storage (up to 120 days) for examination.

DMA and formaldehyde formed in the hake fillets during storage. The minced flesh showed a greater rate of production of DMA and formaldehyde than did the fillets. The TMA, DMA, and formaldehyde contents of freshly minced hake muscle were from 2 to 4 times higher than were those in the fillets. The formation of DMA and formaldehyde was not affected by the exclusion of oxygen (by vacuum packaging of samples). The pattern of formation of DMA and formaldehyde in the stored frozen fillets of hake was the same regardless of packaging method (vacum sealed or air sealed in moisture vapor-proof pouches or wrapped in polyethylene film). But, the formation of DMA and formaldehyde increased steadily in the packaged minced muscle during frozen storage; after 4 months of storage, the minced hake muscle showed from 1.5 to 2 times higher levels of DMA and formaldehyde than did the fillets. The amount of extractable protein in the hake varied directly with the increase in DMA and formaldehyde contents.
[6 figures, 18 references] FTP

3.26 AN ASSESSMENT OF FRESH/FROZEN PREPACKS IN RETAIL OUTLETS

Anonymous
Fish Ind. Rev. 2, No. 3, 4-6 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3640, 728 (Oct. 1972)

The results of a trial conducted by the White Fish Authority to measure the costs of production, distribution and retailing of both chilled and frozen prepackaged fish are reported. It was concluded that the most desirable method of retailing prepacked fish for modest levels of demand was frozen prepacks. D.B. Reprinted

3.338 NEW ERA FOR METAL CONTAINERS

Norman, G. F., and J. A. G. Rees (Research and Development Dept., The Metal Box Co., Ltd.)
Food Manufacture 47, No. 9, 27, 28, 31 (Sept. 1972)

The development of the food can over many years has culminated in such advances as thinner but stronger plate, and differential tin coating. In the processing area filling speeds have increased to over 1,000 cans per minute, and continuous processing techniques are employed.

Today the need of convenience and esthetic improvements are making demands for continuing development of the can. "Easy-Open end" cans have become firmly established among consumers. This type of can requires careful control of the manufacturing process to produce ends of high integrity. The Easy Open end can was originally used for nonprocessed foods such as spices and vacuum-packed peanuts. It is now being used to pack more critical processed foods. Successful packing depends on minimal metal exposure; thus, the plate is lacquered prior to fabrication, and the end is spray lacquered after fabrication to ensure complete coverage. Lacquer systems are being developed to withstand the fabrication process so that the post lacquer step may be eliminated. Products with salt content above 0.5%, having high labile sulfur or acid, and packed in fully lacquered cans, have been found to be the most critical. Mildly acid products in plain cans are the least vulnerable.

Interest has continued in full aperture, aluminum, easy open ends. The cost of all-aluminum cans, the modification of procedures required, and severe bimetallic corrosion when used with tinplate mitigate against aluminum. The oval, all-

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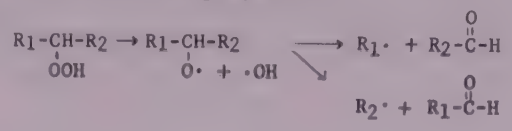
4.21 USE OF LABELED COMPOUNDS TO STUDY THE MECHANISM OF FLAVOR FORMATION IN OXIDIZING FATS

Michalski, S. T., and E. G. Hammond (Dept. of Food Technology, Iowa State University, Ames, IA 50010)
Journal of the American Oil Chemists' Society 49, No. 10, 563-566 (Oct. 1972)

Oxidation of fats produces complex mixtures that include aldehydes, ketones, hydrocarbons, acids, and alcohols. These products arise from scission of the fatty acyl chains. E. R. Bell, J. H. Raley, F. F. Rust, F. H. Seubold, and W. E. Vaughn [Faraday Soc. 10, 242 (1951)] proposed a chain-splitting mechanism represented by the following equation:



The alkyl free radicals can gain a hydroxy free radical to form alcohols and they can lose or gain a hydrogen free radical to form alkanes, alkenes, or alkynes.

The evidence for the scission mechanism is indirect, and some products have been identified that are not attributable to this mechanism. The vinyl ketones and vinyl alcohols, for example, found in oxidized fats require a more complex mechanism.

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4.14 (1.951) THE HARBOR SEAL PHOCA VITULINA CONCOLOR DE KAY: COMPARATIVE DETAILS OF FATTY ACIDS IN LUNG AND HEART PHOSPHOLIPIDS AND TRIGLYCERIDES

Ackman, R. G., S. N. Hooper, and J. Hingley (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Canadian Journal of Biochemistry 50, No. 7, 833-838 (1972)

Reports of other work on the leatherback turtle indicated that phospholipids of the lung were low in polyunsaturated fatty acids (about 3.1%). This small amount was considered to be unusually low for a lipid from a marine animal. In addition, trans-6-hexadecenoic acid was observed to accompany palmitic acid (16:0) in the lipids of the lung and heart.

To compare the occurrence of polyunsaturated fatty acids (PUFA) in the lung of marine animals, and to search for trans-6-hexadecenoic acid accompanying 16:0 into lung tissue, experiments were performed on fresh lungs obtained from a harbor seal.

The fatty acids of phospholipids and triglycerides from the lung and heart of the harbor seal were different from fatty acids in the blubber (depot fat). The difference was due to high levels of PUFA 20:4ω6 in the phospholipids; furthermore, the organ triglycerides resembled the phospholipids in saturated fatty acid composition and the depot fat in monoethylenic fatty acid composition. However, the organ triglycerides had low levels of the PUFAs 20:5ω3, 22:5ω3, and 22:6ω3 compared to depot fat.

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4.60 ANTIOXIDANTS FOR FOOD FATS AND OILS

Sherwin, E. R. (Eastman Chemical Products, Inc., Subsidiary of Eastman Kodak Co., Kingsport, TN 37662)
Journal of the American Oil Chemists' Society 49, No. 8, 468-472 (Aug. 1972)

The types of antioxidants now available for use in food fats and oils are mentioned, and the theoretical and practical aspects of selecting the proper antioxidants for various food uses are discussed. Also, the author discusses the relative potencies, modes of application, and regulations governing use of antioxidants, and some of the important problems encountered in their commercial application. Future needs for and possible developments with fat and oil antioxidants are discussed.
[21 references] FTP

4.61 ANTIOXIDANTS FOR SEAFOOD

Toda, Yoshio, Masayoshi Nishiyama, and Mizuo Imamura (Taiyo Kagaku Kogyo Co., Ltd.) (pat.)
Japanese Patent 19,575/71 (June 1, 1971)
Chemical Abstracts 77, No. 5, 33122j (July 31, 1972)

4.14 (1.951)

Turtle lung phospholipids did not show as much PUFA 20:5ω3 as the seal lung phospholipids, and less 22:6ω3, 22:5ω3, and 20:4ω6. The authors suggest the difference in polyunsaturated fatty acids may be due to evolutionary reasons and unrelated to functional needs.

The presence of trans-6-hexadecenoic acid could not be detected in seal lipids by gas-liquid chromatography (GLC) or in lung phospholipids by silver nitrate-impregnated silicic acid thin-layer chromatography isolation of monoethylenic materials followed by GLC. The accumulation of this acid as a component of the fats of the turtle, the authors suggest, is probably associated with diet. [1 table, 21 references] SW

4.21 THE EFFECT OF HEAVY METALS ON FAT AUTOXIDATION AND THE OCCURRENCE OF HEAVY METALS IN FATS

Franzke, C., S. Grunert, and K. H. Rossow
Lebensmittel-Ind. 19, No. 7, 279-281 (1972) (In German; English summary)
BFMIRA Abstracts 25, No. 10, Abstract No. 3623, 724 (Oct. 1972)

A table is given of the copper, iron and nickel contents of oils from rapeseed, cotton seed, soya, calabash, olive and groundnut. The effect of heavy metals on the autoxidation of fats is considered and a maximum level of 5.5 ppm iron and 0.03 ppm copper is recommended. C.S.B. Reprinted

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4.13 LIPIDS IN FISH FILLET AND LIVER. COMPARISON OF FATTY ACID COMPOSITIONS (4.15)

Lambertsen, Georg (Gov. Vitamin Lab., Norway)
Chemical Abstracts 77, No. 5, 32964y (July 31, 1972)

4.13 FATTY ACID COMPOSITION OF TOTAL LIPIDS IN THE PLAICE PLEURONECTES HERZENSTEINI OF VARIOUS AGE GROUPS

Stepanova, V. A. (Med. Inst., Vladivostok, U.S.S.R.)
Chemical Abstracts 77, No. 1, 2939b (June 19, 1972)

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aluminum, German Hansa can with an Easy Open end has been introduced for fish and other packs.

Fruit juice cans with easy end opening have achieved shelf life of over 12 months. The beer can is no longer made with soldered seams, instead adhesives and welding, and two-piece drawn and wall ironed cans are used. The necked can has also appeared for beer.

Tin-free steel is protected by a very thin chromium/chromium oxide coating in place of tin. The plate is lacquered and nylon bond is preapplied. In fabrication of the can, the blanks are lap bonded by application of heat followed by rapid cooling. Coverage of the lap seam cut edge is essential to prevent iron pickup. The can is then sprayed with a coat of lacquer.

Drawn and wall ironed aluminum and tinplate have been developed for beverage containers. These cans can also be "necked in" to give better appearance and take up less room in storage.

The Soudronic welding process has been developed to weld tinplate. As the welded can has a lap side seam, the cut edge must be covered to prevent iron pickup. The welded can performance is similar to that of the soldered can in storage.

Beaded cans are not new; however, the technique has been applied to the new thin-walled, double reduced plate cans.

Aseptic canning is now practiced to prevent overheating foods. Sterilization of product and container take place separately. Filling and seaming are performed in a sterile environment. One large growth area using this method is the all-aluminum containers for desserts.

With the advent of Easy Open cans for beverages a new family of metal containers is being introduced which will be convenient and have high market appeal. 6 photographs] SW

4.21

Study of the scission reaction is difficult because of the low yields and because the intermediates are unstable. In the present study, therefore, the authors used labeled compounds to study the fate of primary scission products after they are found in oxidizing fats.

2-^{14}C-Hexanal, trans, trans-5-^{14}C-2,4-decadienal, 4-^{14}C-1-octen-3-ol, 4-^{14}C-1-octen-3-one, and 1-^{14}C-1-pentanol were synthesized and added to freshly deodorized soybean oil at levels of 15 p.p.m., 125 p.p.m., 7 p.p.m., 9 p.p.m., and 19 p.p.m., respectively. The soybean oils containing the compounds were oxidized, and the fate of the labeled compounds was followed.

Hexanal was converted to hexanoic acid especially at 50° C. and higher temperature. 2,4-Decadienal was converted to 2,4-decadienoic acid at room temperature; the labeled products included heptenal, 2-octanol, 2-nonanal, glyoxal, and malonaldehyde. 1-Octen-3-ol was converted to 1-octen-3-one at room temperature; the 1-octen-3-one formed a stable end product that produced no other labeled compounds. 1-Pentanol was converted to pentanoic acid at 50° C. and at higher temperature. [1 figure, 3 tables, 27 references] FTP

4.29 EFFECT OF γ-RADIATION ON SEA BASS OIL AND A CHANGE IN IRRADIATED OIL DURING STORAGE

Dubrovskaya, T. A. (U.S.S.R.)
Chemical Abstracts 77, No. 1, 3943k (July 3, 1972)

6.135 (9.19) CONTROLS ODORS AT LOW COSTS

Willoughby, E., and J. Curnick (Giffels Associates, Detroit, Mich.), and J. Curnick (Meade-Johnson Co., Zeeland, Mich.)
Food Engineering 44, No. 10, 107, 110, 112 (Oct. 1972)

Anaerobic waste treatment plants may produce odors of which the principal component is hydrogen sulfide. A plant, which utilizes skim milk in the preparation of diet foods and infant feeding formulas, used the anaerobic digester to reduce the pollutants prior to aerobic sludge system treatment and final discharge. Occasionally, objectionable odors were noticed near the treatment plant, especially on a calm day.

Analysis of digester stack gas samples by gas chromatography indicated the following constituents: nitrogen, 77%; oxygen, 18%; methane, 3.5%; carbon dioxide, 1.6%; ammonia, less than 0.25%; hydrogen sulfide, less than 0.01%; and water vapor, trace.

An odor control system using a hypochlorite solution as a wet scrubbing medium was selected. In this system electrolytic cells generate sodium hypochlorite. The cells consist of graphite anodes surrounded by tubular cathodes with a small annular space in between.

Raw sewage, digested sludge, and other liquid wastes are oxygenated by circulation through the cells. Addition of chlorides such as common salt to the recirculating solution produces a strong sodium hypochlorite solution which is used to scrub the digester exhaust gas. Sodium hypochlorite is an oxidizing

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6.19 COMPARATIVE SELENIUM RETENTION BY CHICKS FED SODIUM SELENITE, SELENOMETHIONINE, FISH MEAL AND FISH SOLUBLES

Miller, David, Joseph H. Soares, Jr., Paul Bauersfeld, Jr., and Susan L. Cuppett (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Poultry Science 51, No. 5, 1669-1673 (Sept. 1972)

Selenium (Se) is essential in the diet of the chick. Reports on Se content of fish meals indicated a range of 2.22 to 2.78 p.p.m. When 10 p.p.m. of α-tocopherol acetate (vitamin E) is present in the diet, the Se requirement can be supplied with 0.05 p.p.m. The content of vitamin E is usually low (3-5 p.p.m. α-tocopherol) in commercial poultry feeds. Since fishery products are the major contributors of Se, its availability and retention from these sources are important factors in poultry nutrition.

A study was conducted to determine the retention by the chick of Se derived from fishery products and to compare the retention of Se from fishery products with Se derived from sodium selenite and selenomethionine.

Two low Se content basal diets used contained crystalline amino acids and high levels of α-tocopherol acetate (200-300 p.p.m.). Day-old chicks were found to contain 11 µg. Se; chicks fed one of the basal diets without Se supplement for 21 days contained 37% less. Day-old chicks with a body reserve of 13 µg. Se, and fed the other basal diet for 18 days, lost 35% Se.

An Se balance in the chick was maintained by a dietary level of 0.05 p.p.m. of sodium selenite, selenomethionine, fish meal or fish solubles supplements to

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6.190 COMPARATIVE FREE CHOICE SELECTION OF VARIOUS FISH MEAL DIETS BY THE CHICK

Berg, Lawrence R., and R. D. Martinson (Dept. of Animal Science, Washington State University, Western Washington Research and Extension Center, Puyallup, WA 98371)
Poultry Science 51, No. 5, 1684-1689 (Sept. 1972)

Results of earlier work indicated that chicks have a sense of taste, and palatability of diet was important in selecting ingredients.

Tests were conducted to determine the palatability of diets containing fish meals produced from various fish. One-week-old chicks were given a choice between diets containing either Peruvian anchovy, herring, or hake meal.

The chicks consumed less of the anchovy meal diet than of diets containing herring or hake meal. Of the anchovy diet they preferred a 10.7% fat content over one containing 6.4% fat. No such difference in preference was found in diets containing hake meals with similar fat contents.

There was no difference in preference for diets containing hake meal, or British Columbia or Atlantic herring meals. The chicks tended to show a preference for diets containing Norwegian herring meal. In comparisons of Norwegian herring meal and anchovy meal, the chicks preferred the herring diet when the meal content was only 5%.

The authors indicated decreased palatability may have been associated with decreased nutritional quality. Chicks in a feeding test weighed about 380 g. on an anchovy diet compared to chick weights of 440 g. on diets made with various herring meals. [5 tables, 5 references] SW

6.32 (6.36) MARINE POLYMERS. IV. DIATOM POLYSACCHARIDES

Allan, G. G., J. Lewin, and P. G. Johnson (University of Washington, Seattle, WA 98195)
Botanica Marina 15, 102-108 (1972)

Information on carbohydrate components in diatoms is lacking. Diatoms are a group of the phytoplankton which are easily cultured. A preliminary examination of the polysaccharide components of several diatom species was performed.

Cells were grown in enriched sea water and collected before any decline of the culture population occurred. The carbohydrate contents of the culture media were determined only after removal, by dialysis, of low molecular weight entities.

In the yield of extracellular water-soluble polymers the deoxyhexoses predominated. Rhamnose was the major constituent; mannose, galactose, and fucose were present in substantial amounts. Xylose, glucose, ribose, and arabinose were minor constituents or absent. Glucuronic acid was present in every polymer examined. Nitzschia frustulum var. perpusilla gave the highest yield of carbohydrate, 15 mg. per liter of culture; the other diatoms tested yielded from 0.1 to 5.2 mg. carbohydrate per liter. The methods used to identify carbohydrate included paper chromatography, gas-liquid chromatography, and ionophoresis. These methods failed to identify three unknown monomers.

Sugars obtained by extraction of the diatoms with hot water and hydrolyzed, included glucose and traces of other sugar monomers of the type found in the extracellular extract.

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6.19

either basal diet. This quantity of Se was supplied by a dietary level of 2.5% fish meal or solubles. When 2.5% fish meal was fed only 13% of the ingested Se was retained. Increasing fish meal to 5% increased the Se retention to 29%. The higher levels of Se derived from fish meal were retained slightly more effectively than Se derived from fish solubles.

The retention value obtained by supplying 0.1 p.p.m. Se derived from sodium selenite was 35%. The retention of Se derived from selenomethionine was greater than from other sources, 48.5%. The maximum retention reached a peak at 0.1 p.p.m. and declined at higher levels of Se ingestion.

The authors suggest that Se retention is maximized when dietary intake of Se is low, or conversely, the retention is minimized when Se intake is comparatively high. [4 tables, 7 references] SW

6.32 (6.36)

The residue remaining after extracting the diatoms with hot water was examined. Mannose was a major component of the hydrolyzate, and galactose content was substantial. Fucose was the main sugar in two hydrolyzates. Xylose was present as a trace; ribose and arabinose were absent. Glucose was present in substantial amounts only in the hydrolyzate from N. angularis which consisted mainly of fucose. Unknown monomers were also present.

Since N. frustulum gave the highest yield of extracellular carbohydrate it was selected for mass culture study. Seventyfold reduction of salt content in the medium doubled cell count, reduced cell size, and increased yield of extracellular polymer sixfold. A minimum in yield corresponded to salinity at which diatom growth was minimal.

Recycling of the culture medium was found to be acceptable by addition of nutrients, sterilization, and reinoculation with diatoms. In addition, the production of polymer started in the period between the log- and stationary-growth phases and continued during the growth phase for 14 days.

Because of their gelling characteristics, the authors suggest that the extracellular polymer from N. frustulum is potentially useful. Furthermore, the growth of new culture in previously used medium refortified with nutrients indicated that a cyclic process is possible.
[2 figures, 6 tables, 17 references] SW

6.130 RENDERING PROCESS

Keith, J. G.; Duke, Inc. (pat.)
U.S. Patent 3,673,227
Food Technology 26, No. 10, 106 (Oct. 1972)

This patent is for a continuous process for dry rendering fish (and animal or poultry) byproducts. FTP

6.135 (9.19) START REDUCING ODOURS NOW TO MINIMIZE COST

The sources, the chemical constituents involved, methods of measurement, and guidelines for controlling the amount of odour produced when rendering offa are described. (From a paper read at the 31st meeting of the National Independent Meat Packers Association, 11-13th May, 1972, Chicago.) C.C.E. Reprinte

Retrum, R.
Nat. Provis., 166, No. 23, 104-108, 113-114 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3767, 753 (Oct. 1972)

6.135 (9.19)

compound; its presence in sewage causes a reduction in oxygen demand. Discharge of sewage treated with hypochlorite into a stream will not harm the environment as much as untreated sewage.

The cost for eliminating the odors on two digesters was $20,000.
[1 figure] SW

6.19 (0.5) KASUGAMYCIN-CONTAINING FEEDS FOR FISH AND WARMBLOODED ANIMALS

Microchemical Research Foundation
French Patent 2,076,415 (Nov. 19, 1971)
Chemical Abstracts 77, No. 7, 47012k (Aug. 14, 1972)

6.37 DUCKWEED AS CHICKEN FEED

Anonymous
Feedstuffs 44, No. 44, 26 (Oct. 23, 1972)

This article reports that researchers at Louisiana State University (LSU) indicate that duckweed might be a suitable ingredient in poultry feeds. The duckweed is a tiny, free floating, aquatic plant common throughout Louisiana. The LSU researchers found that the metabolizable energy value of duckweed was better than that for alfalfa meal.

Duckweed compared favorably with alfalfa as a poultry feedstuff. Duckweed protein was a better source of lysine and arginine than was alfalfa protein, but it contained a lower level of methionine.

If duckweed could be grown economically, its utilization would offer several advantages. It grows well on waste lagoons and grows wild on many bodies of water, thus it could be grown without displacing any other crop activity. Duckweed grows rapidly and is resistant to most pests and plant diseases. Apparently, it removes substantial quantities of chemicals from waste water and, therefore, could be used to reduce chemical contamination of lakes and streams receiving lagoon discharges. FTP

6.33 AGAR PROCESSED FROM GRACILARIA FOLIIFERA OF FLORIDA

Matsuhashi, Tetsujiro, and Kaneo Hayashi (Nagano State Laboratory of Food Technology, Faculty of Agriculture, Gifu University, Japan)
Agricultural and Biological Chemistry 36, No. 9, 1543-1552 (Sept. 1972)

The red alga G. foliifera is found off the south Atlantic coast of the United States. The authors prepared an agar from this alga using the alkali treatment and cooking method of K. Funaki and Y. Kojima [J. Jap. Soc. Sci. Fish. 16, 401 (1951) and ibid. 16, 405 (1951)]. The agar processed from G. foliifera appeared to have good possibilities for commercial uses, including uses in the food industry. Data are given on the chemical and physical properties of agar from G. foliifera and of agars from other seaweeds.
[4 figures, 5 tables, 24 references] FTP

FTP

Seasoned sea urchin egg paste is produced by adding 5'-ribonucleotides.

Yamato Sangyo KK (pat.)
Japanese Patent 16780/72
Food Technology 26, No. 10, 105 (Oct. 1972)

6.54 SEA URCHIN EGG PRODUCT

6.54 APPLICATION OF TERNARY EQUILIBRIUM DATA TO THE PRODUCTION OF FISH PROTEIN CONCENTRATE

McPhee, A. D., and D. L. Dubrow (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Journal of the American Oil Chemists' Society 49, No. 9, 501-504 (Sept. 1972)

Ternary equilibrium data obtained from laboratory studies of the solvent extraction of raw menhaden were examined by standard chemical engineering techniques. The purpose of the study was to determine the theoretical minimum solvent ratios and the number of ideal extraction stages required to produce a concentrate with less than 0.5% residual lipids. The menhaden fish were used because they are commercially available and are suitable for the production of fish protein concentrate (FPC). To determine minimum solvent ratios for the extraction of menhaden, ternary equilibrium data for the systems water-isoproponal-menhaden oil and water-ethanol-menhaden oil were used. These data were reported earlier in J. Chem. Eng. Data 17, No. 2, 244 (1972). Additional data were obtained in this present study in order to calculate the number of extraction stages needed to produce the FPC.

The removal of water and oil from raw fish probably is not strictly a leaching process for all extraction stages. A portion of the water and oil seems to be held loosely by the raw protein, and thus the first extraction stage is little more than a wash. Leaching does occur from the second stage on.

Low temperature (50° C.) extraction of menhaden with azeotropic isopropanol would require a large solvent to solids ratio. The engineering analysis indicates that 100% isopropanol is a better solvent than 87.7% w/w (azeotropic)
(over)

6.54 (0.5) EXPERIMENTAL PRODUCTION OF ENTEROTOXIN B IN FISH PROTEIN CONCENTRATE

Fung, Daniel Y. C. (Dept. of Microbiology, Pennsylvania State University, University Park, PA 16802)
Journal of Milk and Food Technology 35, No. 10, 577-581 (Oct. 1972)

Fish protein concentrate (FPC) contains a wide distribution of amino acids, vitamins, and minerals and is easily digested by human beings. Because it is nutritious and suitable for growth of animals, it is likely, too, that FPC might support the growth of microorganisms. This paper reports on the growth of and toxigenesis by S. aureus S-6 in aqueous suspensions of two commercial samples of commercially prepared FPC, in beef broth, and in suspensions of two solid foods supplemented with FPC. The two commercial samples of FPC were suspended in distilled water as 1, 3, 5, 10, 15, 30, and 50% (w/v) levels, then the suspensions were sterilized. Vitamins (biotin, pantothenate, niacin, and thiamine) were added to a similar series to determine the effect of the addition of vitamins on the growth of and toxin formation by the test organism S. aureus S-6. Two FPC samples were added, individually, at levels of 0, 1, 5, and 10% (w/v) to the beef broth base, and to 50% suspensions of corn flour and of wheat flour. The test mixtures (slurries) were sterilized. S. aureus inocula were introduced into the sterile suspensions of the FPC samples and the FPC--supplemented food samples (includes the beef broth).

S. aureus S-6 was able to grow and to produce entertoxin B in sample suspensions of commercially prepared FPC and of foods supplemented with FPC. The yields
(over)

6.54 (0.8) ENGINEERING ECONOMIC MODEL FOR FISH PROTEIN CONCENTRATION PROCESSES

Almenas, K. K. (University of Maryland, Dept. of Chemical Engineering, College Park MD 20740), L. C. Durilla (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740), R. C. Ernst, J. W. Gentry, M. B. Hale, and J. M. Marchello
NOAA Technical Report NMFS CIRC-367, U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Washington, DC 20235 (Oct. 1972), iii + 175 pp. For sale by the Superintendent of Documents, Government Printing Office, Washington, DC 20402. Price $1.50.

A process engineering economic model for fish protein concentration processes has been developed. The model predicts the construction and operating costs for fish meal plants and for plants producing fish protein concentrate (FPC) by: isopropyl alcohol extraction, biological, and press cake-isopropyl alcohol extraction.

Typical process flow sheets and a computer program were developed to be used in the design and cost computations. The model provides for each process to be studied both internally and externally in comparison with alternate processes. The program and model were prepared in such a way that changes and updating may be accomplished quite readily as new information becomes available. This report contains directions for users and descriptions of the processes. A listing of the computer program and example calculations for each process are presented in the Appendix to guide the user and to illustrate the nature of the model output.

While the model does develop construction, operating, and production aspects of the processes, it does not deal with the economics of selling the products and
(over)

6.54 ISOLATING PROTEIN FROM FISH OR FISH PRODUCTS

Gasser, Rupert Josef, and Lienhard Hodo Huster (pat.) (Societe des Produits Nestle S.A.)
German Offen. (patent) 2,145,936 (Mar. 30, 1972)
Chemical Abstracts 77, No. 5, 33098f (July 31, 1972)

6.54 (0.5)

of enterotoxin B increased with the increase in level of FPC in the FPC suspensions and in the FPC-supplemented foods. This information does not and should not imply that FPC is not a safe food, but rather that care should be exercised in the manufacturing, packaging, shipping, and storing of this highly nutritious food.
[4 figures, 1 table, 37 references] FTP

6.54 FORMING GELS FROM FISH PROTEIN PREPARATIONS, ESPECIALLY FOR FOODS

Stala, Aleksander, and Teresa K. Szacillo (Morski Instytut Rybacki) (pat.)
German Offen. (Patent) 2,146,389 (Mar. 30, 1972)
Chemical Abstracts 77, No. 5, 33093a (July 31, 1972)

Finely divided fish is hydrolyzed with acid (pH 1.5 or lower) at elevated temperature and pressure. The hydrolysate is then separated into oil and protein fractions. FTP

6.54 FISH PROTEIN HYDROLYSATE

Roels, O.; John J. Ryan & Sons, Inc. (pat.)
Canadian Patent 902,420
Food Technology 26, No. 10, 101 (Oct. 1972)

6.54 (0.8)

the resulting profit and return on investment. Problems of allocation of costs and marketing arrangements are not covered in this report, but must be considered in the final decisions relating to a complete evaluation of alternatives.
[6 figures, 6 tables, 7 references] Authors' abstract

6.54 THE POTENTIAL OF FISH PROTEIN CONCENTRATE FOR DEVELOPING COUNTRIES
(6.19)

Anonymous
PAG Bull., 2, No. 2, 11-20 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3637, 727 (Oct. 1972)

The first part of PAG statement 16 on FPC introduces the product and discusses the functions of FPC, particularly in relation to supplementing deficient diets with protein. FPC's have been divided into two groups. Type A products are odourless, bland powders with a very low lipid content and light in colour; utilization is limited to that of protein food additives to increase the nutritional value of other foods. Type B products are flavourful, have a higher lipid content and may be in the form of paste, powder, liquid etc.,; they would be marketed as forms of preserved fish. The quality, safety, organoleptic characteristics and acceptability of FPC, and potential regional supplies of the appropriate fish are discussed. Reprinted

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6.54

isopropanol, and that ethanol was the poorest solvent of the three. Ethanol would require a solvent-to-solids ratio that would be economically prohibitive.
The solvent-to-solid ratio used by the National Marine Fisheries Service in its Experiment and Demonstration Plant [Commercial Fisheries Review 33, No. 2, 22 (1971)] in which fatty fish is used, is 2:1 using five stages plus a slurry mix tank, and using azeotropic isopropanol at a temperature of 80° C.
[5 figures, 3 tables, 13 references] FTP

6.54 NON-MEAT PROTEINS FOR FRANKFURTER MANUFACTURING

Smith, G. C., et al.
J. anim. Sci. 35, No. 1, 207-208 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3695, 739 (Oct. 1972)

The effect of soya protein isolates, soya protein concentrates, soya flours glandless cottonseed meals, fish protein concentrate, non-fat dry milk, and cottonseed protein concentrate upon emulsion stability were studied and the results are briefly reported. (Taken from abstract No. 166 of abstracts of papers for presentation at the 64th Annual Meeting of the American Society of Animal Science.) C.C.E. Reprinted

6.54 MAKING FISH PROTEIN CONCENTRATES BY ENZYMATIC HYDROLYSIS. A STATUS REPORT ON RESEARCH AND SOME PROCESSES AND PRODUCTS STUDIED BY NMFS

Hale, Malcolm B. (Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
NOAA Technical Report NMFS SSRF-657, v + 32 pp. (Nov. 1972) National Marine Fisheries Service, U.S. Department of Commerce) For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402. Price 50 cents.

Fish protein concentrates (FPC) are products derived from fish by processes in which the fish protein is placed in a more highly concentrated and stable form. As a form of animal protein FPC can supplement vegetable proteins very effectively. Added in low concentrations they can markedly improve the nutritive value of bread and many other common foods by supplying certain essential amino acids in which vegetable proteins are deficient.

FPC may be prepared by various biological, as well as chemical, procedures. Both microbial cultures and isolated enzymes have been used for this purpose. This report summarizes research that has been carried out by the National Marine Fisheries Service (formerly Bureau of Commercial Fisheries) on biological methods for FPC production. The effects of various processing conditions and commercially available proteolytic enzymes on yields and characteristics of water-soluble fish protein hydrolysates are presented.

Soluble FPC prepared from red hake (Urophycis chuss) tended to be deficient in either tryptophan or histidine, depending on the pH of hydrolysis. Hydrolysis

(over)

8.53 ISOMER SUBFRACTIONATION EFFECTS IN THE STUDY OF LONGER CHAIN MONOETHYLENE FATTY ACIDS IN HYDROGENATED OILS

Ackman, R. G., S. N. Hooper, and J. Hingley (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of Chromatographic Science 10, 430-436 (July 1972)

As part of a study of the composition of a pure marine oil hydrogenated for margarine production, a preliminary analysis was performed using silver nitrate-silica gel thin-layer chromatography (TLC) and open-tubular gas-liquid chromatography (GLC). A sample of commercial margarine, purchased retail at random, and labeled 90% marine oil, 10% vegetable oil, was tested.

The TLC of the methyl esters of the margarine fatty acids gave a pattern of four distinct bands of monoethylenic unsaturation. The compositions of the bands were compared by GLC. The four bands were found to be composites, each of the four major chain lengths of marine oils being represented: 16:1, 18:1, 20:1, and 22:1. The longer chain lengths were more concentrated in the most mobile band (22:1).

Fractionation within each band was based on the trans isomers being more mobile than the cis isomers. A further subfractionation of both cis and trans materials was possible because of the greater mobility of isomers with unsaturation closest to the terminal methyl group of the chain. Mobility of these monoethylenic fatty acids also depends on geometry and proportion of methylene groups to the ethylenic double bond.

[9 figures, 4 tables, 29 references] SW

7.42 NEUTRON ACTIVATION ANALYSIS OF MERCURY IN FISH, FLOUR, AND STANDARD REFERENCE ORCHARD LEAVES BY ELECTRODEPOSITION RADIOCHEMISTRY

Heitzman, M. W., and R. E. Simpson (Division of Chemistry and Physics, Food and Drug Administration, Washington, DC 20204)
Journal of the Association of Official Analytical Chemists 55, No. 5, 960-965 (Sept. 1972)

This method for neutron activation analysis of mercury utilizes electrodeposition to isolate the mercury carrier in the recovery step. The recovery of mercury was variable, nevertheless, the results were comparable to those obtained using sulfide precipitation in neutron activation analysis and gas chromatographic techniques. By this method mercury can be detected to parts per billion levels.

[2 figures, 1 table, 6 references] FTP

8.8 (0.8) DETECTION OF FOREIGN BODIES

Preece, Kenneth (Scientific Equipment Group, National Research Development Corp.)
Food Manufacture 47, No. 9, 21-22, 51 (Sept. 1972)

While the problem of contamination of food by unwanted inclusions is of continual concern, most incidents are of a nuisance type rather than a health hazard. Reports indicated that the number of complaints to local authorities has increased each year; for example, over 7,000 in 1967 to over 9,000 in 1970. Complaints of this nature are small compared to total sales.

Electronic metal detectors are useful in many cases but many foreign bodies such as stones, bone, and glass are undetectable by these instruments. Over the past few years the National Research Development Corporation (NRDC) with members of the Food Industry, and BFMIRA, together have made an effort to analyze the need and develop equipment for detection of nonmetallic foreign material in food.

The possibilities examined included the use of X-rays, gamma rays, infrared and visible light, and ultrasonics. The results indicated the most promising of these is soft X-rays with a detector system having a resolution of 1.5 to 2 mm. and signal-processing electronics capable of distinguishing an anomaly against the normal density profile of the product to particles of 1.5-mm. size.

To be economically justifiable a practical system would have to satisfy the following conditions: capital cost not exceeding £5,000; high reliability and minimum attention; cost of replacement components not to exceed £500 per year.

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7.42 (9.19) MERCURY CONTENT OF COMMON FOODS DETERMINED BY NEUTRON ACTIVATION ANALYSIS

Tanner, James T., Melvin H. Friedman, and David N. Lincoln (Division of Chemistry and Physics, FDA, Dept. of Health, Education and Welfare, Washington, DC 20204), Leonard A. Ford, and Max Jaffee
Science 177, No. 4054, 1102-1103 (Sept. 22, 1972)

Representative nationwide samples of foods were collected and analyzed for mercury content. Neutron activation analysis was used. The results are shown in the table that follows.

Food sample	Number of samples analyzed	Minimum amount of mercury detectable	Number of samples with below the detection limit of mercury	Mercury content	
				Range [1]	Median [1]
		p.p.b.		p.p.b.	p.p.b.
Flour [2]	28	3	25	<MD-6	<MD
Milk, dry [2]	33	4	13	<MD-27	10
Milk, whole	32	1	23	<MD-9	<MD
Sugar [2]	22	3	17	<MD-10	<MD
Potatoes	33	1	14	<MD-15	3
Beef	23	2	9	<MD-7	3
Chicken	24	1	9	<MD-7	3
Shrimp	32	2	0	5-43	14
Liver	22	2	11	<MD-8	3
Eggs	33	2	30	<MD-5	<MD

[1] <MD = less than the minimum amount of mercury detectable for the particular food.
[2] Not freeze-dried.

The authors conclude that, with the exception of certain fish, the major foods in the United States are essentially free of mercury. [2 tables, 11 references]

FTP

8.8 (0.8)

The main elements of the developed prototype detection system were as follows: (1) an X-ray source operating at 40 kv., 1 kw.; (2) a test aperture capable of accepting products up to 7 in. high and 6 in. wide; (3) a fluorescent screen to receive the X-ray beam; (4) a linear array of 96 photodetectors; (5) a conveyor capable of operating at 120 feet per minute; and (6) signal processing electronics for operating an automatic sorter.

The results of working with the prototype are as follows: (1) in thin, low-density products most of the contaminants could be detected with reasonable certainty; (2) in dense or thick products, contaminants could not be detected; (3) in products of intermediate density only metallic or large nonmetallic inclusions could be detected; and (4) bone or 5-mm.-size particles could not be detected.

The consortium of NRDC, BFMIRA, and others decided not to proceed further with the project, but they are maintaining a watch on the technology in the hope that new techniques or equipment may provide a basis for a successful detector. [1 figure, 1 table, 2 references]

SW

8.8 CHANGES OF OIL IN A STEAM-OIL FRYING UNIT (2.8)(4.81)

Yuzhakova, V. V., and L. M. Shashlmova (Kiaiped. Fil., Tsentr. Proekt.-Tekhnol. Byuro, Kiaipeda, U.S.S.R.)
Chemical Abstracts 76, No. 19, 111834p (May 8, 1972)

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of raw fish with an alkaline protease of Bacillus subtilis at pH 8.5 or above gave the best balance of essential amino acids and a high yield of soluble product. Pancreatin also gave very good results at pH 8.5. The protein efficiency ratio (PER) of a totally soluble FPC prepared from alewife (Alosa pseudoharengus) was equivalent to that of casein. Soluble products prepared from hake were equivalent to casein as a wheat supplement but not as a sole source of protein. Process outlines and preliminary cost estimates are presented for the production of two types of fish protein hydrolysates. Possible food uses and the flavor problem are discussed. This report includes a literature survey of fish protein modifications by fermentation and selected chemical hydrolysis methods as well as by enzymatic hydrolysis processes.
[15 figures, 17 tables, 40 references]

Reprinted in part

6.54 (6.130) APPARATUS AND METHOD FOR CONTINUOUS EXTRACTION OF FATS FROM ORGANIC MATTER

Östermann, Sven Olof (Astra Nutrition AB)
U.S. Patent 3,565,634 (Feb. 23, 1971)
Chemical Abstracts 77, No. 13, 86783g (Sept. 25, 1972)

9.12 (0.38) PARTICULATE BIOLUMINESCENCE IN DINOFLAGELLATES: DISSOCIATION AND PARTIAL RECONSTITUTION

Fuller, C. W., Paul Kreiss, and H. H. Seliger (McCollum-Pratt Institute and Dept. of Biology, Johns Hopkins University, Baltimore, MD 21218)
Science 177, No. 4052, 884-885 (Sept. 8, 1972)

V. C. Bode and J. W. Hastings [Arch. Biochem. Biophys. 103, 488 (1963)] described two distinct in vitro bioluminescent systems for the marine dinoflagellate Gonyaulax polyedra. One is a soluble system consisting of the enzyme luciferase, the substrate luciferin, and oxygen; the system requires high salt concentrations and exhibits slow kinetics of light emission. The other is a particulate system; it emits a single flash as the result of an increase in hydrogen ion concentration.

With the same extraction conditions used for G. polyedra, the authors isolated soluble and particulate bioluminescence from Pyrodinium bahamense and Pyrocystis lunula. They were able to dissociate soluble luciferin and luciferase from the particulate system.

The results do not resolve the question of whether the in vivo luminescence is due to soluble or particulate components. However, this finding in additional species of particulate systems that are labile, contain dissociable luciferase and luciferin, and can be made to recycle by the addition of luciferin, tends to strengthen the belief that the particulate system is the physiological one. [2 tables, 12 references]

FTP

9.15 ACUTE TOXICITY OF SPENT SULPHITE LIQUOR TO ATLANTIC SALMON (SALMO SALAR)

Wilson, R. C. H. (Dept. of the Environment, Environmental Protection Service, P.O. Box 5667, St. John's Newfoundland, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 8, 1225-1228 (Aug. 1972)

The major method of paper production in eastern North America is the sulfite pulping process. Pulp mills are usually located near a body of water and often dump their effluent into that water. The discharge of spent sulfite liquor (SSL) into the water causes turbidity at first, then oxygen depletion. In addition, a quantity of hydrogen ions is also introduced into the water making it acidic.

Static bioassays of 96-hr. duration were performed to determine SSL toxicity to Atlantic salmon (Salmo salar) parr. Four static bioassays were performed. Three used fresh SSL, while the fourth used oxidized SSL.

As the concentration of SSL increased above 475 parts per million (p.p.m.), the dorsal part of the fish darkened, which masked the parr marks. At an SSL concentration of over 1,000 p.p.m., loss of reaction to sudden, external movement was observed followed by rapid and irregular breathing. At the higher concentrations (above 2,500 p.p.m.), fin edges became white and extremely brittle. Death was preceded by loss of orientation, immobility, very rapid breathing and, finally, spasms.

Fish exposed to oxidized SSL had a higher LC50 (level at which 50% of the test fish would survive), and responded differently to the concentration of SSL than those fish exposed to fresh SSL. The higher LC50 is presumably due to alteration of the levels of one or more toxic components in the oxidized SSL. A higher

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9.15 ACUTE AND CHRONIC TOXICITY OF CADMIUM TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS)

Pickering, Quentin H., and Marion H. Gast (U.S. Environmental Protection Agency, National Water Quality Laboratory, Cincinnati, OH 45244)
Journal of the Fisheries Research Board of Canada 29, No. 8, 1099-1106 (Aug. 1972)

Cadmium occurs in small quantities in natural water and in large quantities in water receiving industrial wastes. Although cadmium pollution is not critical at the present time, its pollution potential is high due to its high toxicity and long biological half-life.

Two continuous-flow bioassays were conducted to determine cadmium toxicity to the fathead minnow (P. promelas). The second test came 2 years later to evaluate the precision and repeatability of chronic bioassays.

Two chronic tests were conducted along with acute tests. The first chronic test was performed with adult fish obtained from a local fish farm. The second chronic test was performed with their 3-week-old fry. The acute tests were composed of two 96-hr. static bioassays and five continuous-flow bioassays.

Chronic test one resulted in a slow, cumulative mortality at the two highest concentrations and no mortality in the three lowest concentrations and control fish. Results for chronic test two were similar to chronic test one, except that survival at the lower concentrations was similar to control fish survival (approximately 70%). Other results indicated that the lower cadmium concentrations had no significant effect on egg hatchability, growth of adults and fry, and egg production. High cadmium concentrations had an adverse effect on embryo circulatory

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9.16 (1.85) DEVELOPMENTS IN THE LABORATORY CULTURE OF THE COMMON PRAWN, PALAEMON SERRATUS (PENNANT)

Wickins, John F. (Fisheries Experiment Station, Ministry of Agriculture, Fisheries and Food, Conway, England)
Fishery Investigations Series II, 27, No. 4, v + 23 pp. (1972) (Ministry of Agriculture, Fisheries and Food, London, England) Her Majesty's Stationery Office. 76 p

These studies indicate the possibility of commercial prawn culture in the United Kingdom. The prawn P. serratus (P.) was cultured through four generations in captivity. The mean generation time was 8 months. Larvae grew equally well for most of the year in either natural or filtered sea water which was renewed at 3-day intervals. Mixtures of antibiotics to cultures slightly retarded growth of the larvae, which were otherwise unaffected. Continual illumination of larvae gave best results.

Good food for larvae were newly hatched nauplii of Artemia salina (L.) from Saskatchewan and San Francisco. The larvae completed their development more rapidly when cultured with Artemia in the presence of the alga Isochrysis galbana.

During the mass culture of larvae, 50,000 postlarvae were reared with a mean survival of 27%. Postlarvae grew well when food was available 16 hr. per day.

The most efficient production in terms of weight of prawns produced per gram of prawns stocked per square meter of tank floor area was obtained in tanks containing 350 prawns per square meter. These yielded, after 3 months, 14.45 grams per gram of prawn stocked per square meter.

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9.16 EXPERIMENTAL STUDIES OF POLYCULTURE IN 1971

Yashouv, A., and A. Halevy (Fish Culture Research Station, Dor, Israel)
Bamidgeh 24, No. 2, 31-39 (June 1972)

Reports of other work on polyculture showed the benefits derived from maintaining carp, silver carp, and tilapia together in the same pond. Excessive algal bloom in the surface layer absorbed the efficient sunlight thus photosynthesis decreased in the water layers below. Primary production of phytoplankton 30 cm. below the surface was inhibited by the reduced amount of sunlight available at that depth. Silver carp feed on algae and other phytoplankton. They consumed the algae on the surface, which caused increased production of phytoplankton at the lower depths. Carp browsing at the bottom stir up organic matter which is suspended in the water and ingested by the silver carp. The tilapias prevent conditions of oxygen depletion by removing organic matter from the bottom and allow for development of food animals which are consumed by the carps.

Experiments were carried out on polyculture of carp, silver carp, and tilapias under fertilization with and without supplementary feedings. Fertilization without supplementary feedings consisted of adding to two ponds--60 kg. of ammonium sulfate and 60 kg. superphosphate per hectare biweekly and in alternate weeks 60 kg. of poultry droppings. Two other ponds received the same amounts of fertilizer weekly.

Total yields after 187 days' growth reached 2,352 kg./ha. in ponds with biweekly fertilization and 2,986 kg./ha. in ponds with weekly fertilization. Weekly

(over)

9.15

systems, inhibiting red blood cell circulation. The results showed that the maximum acceptable toxicant concentration is between 57 and 37 µg. Cd/liter. These figures were supported by the results of chronic test two, indicating high reproducibility of chronic tests. [6 tables, 23 references]
Lee Thorson

9.15 (9.19) TOXICITY OF MERCURY OF PHYTOPLANKTON

Nuzzi, Robert (New York Ocean Sci. Lab., Montauk, N.Y.)
Chemical Abstracts 77, No. 9, 57262f (Aug. 28, 1972)

concentration of oxidized SSL was needed to kill the same percentage of fish in an equal amount of time than that of fresh SSL.

These results for 96-hr. LC50's on Atlantic salmon parr are similar to those obtained for Pacific salmon. However, 30-day continuous flow bioassays on Pacific salmon gave much lower LC50's than the 96-hr. assays. Therefore, application of these results on sulfite pulpmill wastes to field situations should be made with caution. [3 figures, 2 tables, 12 references]
Lee Thorson

9.15 METHODOLOGY FOR STUDYING THE POISONING OF FISH

Kanaev, A. I., and V. V. Metelev (Vses. Inst. Eksp. Vet., Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 9, 57195m (Aug. 28, 1972)

fertilization increased the carp yield 33.3% and the silver carp yield by 29.7%. The effect on tilapia growth was minimal.

In experiments with fertilization and supplementary feedings six ponds received weekly fertilization and pellets containing 25% protein. The daily ration of pellets was 4% of the carp biomass plus 2% of the tilapia biomass. Results indicated that fertilization and supplementary feeding increased carp yields fourfold and tilapia yield sevenfold. Silver carp yield did not respond to supplementary feeding.

The authors believe that the addition of tilapia to the polyculture caused increased growth increments of the carp and silver carp; furthermore, the results indicate the advantage of polyculture of these three fishes.
[4 tables, 5 references]
SW

9.15 SENSITIVE INDEXES AND CHANGES IN THE SYSTEMS OF FISH DURING POISONING

Krylov, O. N. (Gos. Nauchno-Issled. Inst. Ozern. Rechn. Rybn. Khoz., Leningrad, U.S.S.R.)
Chemical Abstracts 77, No. 9, 57247e (Aug. 28, 1972)

9.16

9.16 (1.85)

Cannibalism was the greatest single cause of mortality in captive prawns; it was reduced by increasing the effective floor area of a tank. The increased area was achieved by providing a stack of black PVC sheets spaced about 5 cm. apart mounted horizontally on a wooden frame. More prawns used the sheets for resting than used the floor thereby increasing the effective floor area.

When the experiment ended the prawns were 15 months old and had more than doubled their weight in the previous 4 months.
[9 figures, 12 tables, 17 references, 2 plates]
SW

9.12 (1.70) SHARK-TAGGING: KEEPING TRACK OF ONE OF WORLD'S GREAT SURVIVORS

Holden, Constance
Science 177, No. 4050, 681-682 (Aug. 25, 1972)

This article describes an expedition aboard the fishing boat Dorothy T. into Delaware Bay to attach tags to sandbar and sand tiger sharks. Although industrial pollution has reduced the numbers of certain fish and shellfish in Delaware Bay, sharks are plentiful. This tagging operation was part of the program of the American Littoral Society, Sandy Hook, N.J. The organization was established in 1961 as a conservation and information organization for those interested in fish and in preserving the ecology of coastal areas. It publishes the bulletin Underwater Naturalist.
FTR

9.16 (1.37) EFFECTS OF METABOLIC PRODUCTS ON THE QUALITY OF RAINBOW TROUT

Smith, Charlie E. (Fish Cultural Development Center, Bureau of Sport Fisheries and Wildlife, Bozeman, MT 59715)
American Fishes and U.S. Trout News 17, No. 3, 7-8, 21 (Sept.-Oct. 1972)

Fish reared in hatcheries under crowded conditions and reused water are exposed to elevated concentrations of accumulated excretory products. These end products of metabolism are detrimental to the growth of fish.

In other work ammonia and urea were reported to be the only dissolved excretory products found in measurable amounts in water of salmonid hatcheries. Furthermore, urea had no detrimental effect on gill tissue but un-ionized ammonia was found to be toxic. Results of a short-term experiment of 6 weeks indicated that growth of trout was not affected by toxic concentrations of 0.8 to 1.0 p.p.m. of ammonium hydroxide when the oxygen level was maintained at 7.0 to 8.0 p.p.m.

In experiments conducted over a 12-month period ammonia content was held to a level of 0.5 p.p.m. for controls, and test fish were exposed to concentrations of 1.0 to 1.5 p.p.m. as total ammonia. The pH of the water was at 7.75 plus or minus 1, and the temperature was maintained at 50° F.

Results indicated that growth of trout was not affected after 4 months exposure to 1.2 and 1.6 p.p.m. ammonia. Oxygen concentrations were 5.80 to 7.45 p.p.m. There was a reduction in weight of fish exposed to 1.6 p.p.m. after 6 and 12 months. After 6, 9, and 12 months some fish reared in the highest ammonia environment were emaciated and lethargic. Microscopic examination of gill and liver tissues showed severe pathological changes.

(over)

9.16 (1.85) EFFECT OF FISH REMOVAL ON THE GROWTH AND CONDITION OF WHITE SHRIMP, PENAEUS SETIFERUS (LINNAEUS), IN BRACKISH PONDS

Parker, Jack C., Hoyt W. Holcomb, Jr., Wallace G. Klussmann (Texas Agricultural Extension Service, Dept. of Wildlife and Fisheries Sciences, Texas A & M University, College Station, TX 77840), and James C. McNeill, IV (Brazoria County Mosquito Control District, Angleton, Tex.)
Texas A & M University Sea Grant Program, Report TAMU-SG-72-701, ii + 12 pp. (June 1972) (College Station, TX 77840) No price

Previous work reported that a pond from which predacious fish had been removed yielded almost twice the return of shrimp as a pond where predators were allowed.

The effect on growth and condition of juvenile white shrimp was examined in relation to absence or presence of fish. A 1.0-hectare (ha.) pond was treated with a rotenone compound (Chem Fish Collector) at a rate of 1 p.p.m. The species that were found dead were menhaden, worm eel, sheepshead minnow, Gulf killifish, sailfin molly, spot, striped mullet, and tidewater silversides. These species were abundant in a 0.5-ha. pond. Juvenile white shrimp were stocked in both ponds at a rate of 50,000 per ha. and fed a supplemental pelleted ration 3 days per week at a rate of 10% of their estimated total weight.

After 77 days, shrimp in the treated pond averaged 12.3 mm. longer and 4.0 g. heavier than those in the pond with fish. Seine samples indicated that abundance of shrimp had declined in the pond containing fish. Condition of the shrimp in the treated pond was better than those in the untreated pond. This difference was

(over)

9.19 PHTHALIC ACID ESTERS: BIOLOGICAL IMPACT UNCERTAIN

Marx, Jean L.
Science 178, No. 4056, 46-47 (Oct. 6, 1972)

In 1972, about 1 billion pounds of phthalic acid esters were used in industry, in the home, and in medical science. Most of the phthalates are used as plasticizers to impart the desired flexibility and workability to plastics (usually polyvinyl chloride). Evidence indicates that the phthalates may have become general environmental contaminants. In September 1972, the National Institute of Environmental Health Sciences, Research Triangle Park, N.C., sponsored a conference to assess the current state of knowledge concerning the phthalic acid esters. The proceedings of the conference will be published in the January 1973 issue of the new journal Environmental Health Perspectives. The present article reports some comments at the conference relative to the biological significance of the esters in the environment.

Researchers reported phthalate levels from 1 to 2 p.p.b. in two rivers in Boston and as high as 0.6 p.p.b. in the Mississippi River. Phthalates were also found in air samples.

Quantitative information on the origin of phthalates in the environment is not known. Pesticides contain phthalate carriers and may release the compounds directly into the soil, water, and air. Also phthalates may be leached into the environment from polyvinyl chloride. Some bacteria, fungi, and plants are able to synthesize phthalates.

Although some scientists believe that the phthalates are relatively biodegradable, most consider the evidence for biodegradability inconclusive.

(over)

9.19 POLYCHLORINATED BIPHENYL RESIDUES: ACCUMULATION IN CAYUGA LAKE TROUT WITH AGE

Bache, Carl A. (Pesticide Residue Laboratory, Cornell University, Ithaca, NY 14850), James W. Serum, William D. Youngs, and Donald J. List
Science 177, No. 4055, 1191-1192 (Sept. 29, 1972)

The levels of polychlorinated biphenyls (PCBs) were determined in lake trout from Cayuga Lake in Ithaca, N.Y. The compounds were determined by column chromatographic isolation, specific detector gas chromatography, and mass spectrometry. The ages of the fish were also recorded; this information was available because the fish in the lake are stocked annually as yearlings.

The level of PCBs in the lake trout (whole fish) varied directly with the age of the fish. The following table (a consolidation of the original) shows the levels of PCBs in the lake trout as a function of the age of the fish.

[2 figures, 1 table, 8 references]

Age of lake trout	Number of fish samples	Range of contents of PCBs in the whole fish
years		p.p.m.
1	4	0.5 - 1.6
2	3	1.3 - 2.5
3	3	1.2 - 2.4
4	3	3.5 - 5.1
5	1	5.7
6	3	3.4 - 9.7
7	2	4.0 - 10.5
8	3	4.5 - 17.5
9	1	30.4
11	1	12.4
12	3	7.4 - 26.2

FTP

9.16 (1.81) SETTLEMENT OF OSTREA EDULIS (L.), IN RELATION TO THE CULTIVATION OF OYSTER GROUNDS

Waugh, G. D. (Marine Dept., Wellington, New Zealand)
Fishery Investigations Series II, 27, No. 2, v + 34 pp. (1972) (Ministry of Agriculture, Fisheries and Food, London, England) Her Majesty's Stationery Office. 95p

Experiments designed to evaluate the merits of harrowing oyster grounds or relaying shell on them to increase the catch of settled oyster spat were performed.

Results indicated that the relaying of shell caused an increase in the numbers of spat per unit area of bottom. Harrowing did not result in an increase; furthermore, it had a long-term adverse effect on the growth of the oysters damaged by the harrows. In the relaying of shell the author suggested that care must be taken to avoid introducing predators if the shell is freshly dredged.

Of the various types of shell used in relaying, Ostrea edulis, Chlamys varia, and Mytilus edulis were equally suitable for spat attachment. The shells of M. edulis were the most useful because they are more friable and the spat on them can be separated more readily.

Examination of the spat on the shells and their general distribution in relation to the numbers of shells available has shown evidence of aggregation of spat that is attributed to gregarious settlement. Another explanation for the aggregation of spat is the corresponding aggregation of planktonic larvae. In studies of spat in the River Fal it was found that, in general, there was a positive relation between abundance and variety of sedentary forms of fouling organisms and the abundance of settled spat.

Limited observations on spat survival indicated that postsettlement mortality is of the order of 93% after 12 months.

[8 figures, 15 tables, 40 references] SW

9.16

probably due to the seed stock in each pond coming from different bay populations The authors suggested that the predacious fish not only reduced the numbers of shrimp, but also competed with them for food and depressed their growth rate.

[4 figures, 1 table, 3 references] SW

9.17 (1.87) ENHANCEMENT OF LOBSTER GROWTH

Hughes, John T., and John J. Sullivan (Massachusetts Dept. of Natural Resources, Division of Marine Fisheries, Lobster Hatchery and Research Station, Vineyard Haven, MA 02568), and Robert Shleser

Science 177, No. 4054, 1110-1111 (Sept. 22, 1972)

Lobsters raised in warm (22° to 24° C.) sea water grew at least four times as fast as they would normally in the wild (at ambient ocean temperatures). Selected captive lobsters were successfully mated at the Massachusetts Lobster Hatchery. The progeny reached sexual maturity (about 454 grams) in less than 2 years; it takes about 8 years at ambient ocean temperatures in the wild. By selecting the fast-growing lobsters, it may be possible to produce marketable size lobsters in about 18 months. These results (the successful mating of selected parents and acceleration of growth of lobsters) suggest that lobster farming may be possible.

[4 figures, 4 references] FTP

.16 (1.37)

At the end of 9½ months there was no increase in mortality; however, after 12 months exposure to 1.6 p.p.m. ammonia a bacterial gill disease resulted in severe mortality in one tank.

The results indicated that if oxygen levels were maintained at 5.0 p.p.m. growth of trout was not affected until ammonia concentrations reached 1.6 p.p.m. (0.033 p.p.m. unionized ammonia) and after 6 months' exposure. The author suggests that trout may be maintained in environments that have more than the recommended 0.1 p.p.m. of ammonia with no detrimental effects.

[4 tables, 6 references] SW

9.19

Researchers have found di-n-butyl phthalate (DNBP) and di-2-ethylhexyl phthalate (DEHP) in specimens of fish, crustaceans, and water collected throughout North America. Further, it was shown that the marine species could concentrate DNBP and DEHP from water containing about 1 to 2 p.p.b. of the chemicals; after 7 days the organisms contained from 350 to 3,900 times that in the water. The implication is that DNBP and DEHP can accumulate in the food chain.

Most of the participants at the conference agreed that the phthalic acid esters do not appear to pose an imminent threat to human health. On the other hand, the phthalates are widely distributed in the environment and the question has been raised about the subtle effects of persistent exposure to very low concentrations of the chemicals.

A review entitled "Toxicity and health threats of phthalate esters: Review of the literature" by J. Autian [Oak Ridge National Laboratory, Oak Ridge, Tenn. (1972)] is available from the National Technical Information Service, U.S. Department of Commerce, Springfield, Va.

[2 references] FTP

9.19 THE PURIFICATION OF EFFLUENT IN THE MEAT AND FISH INDUSTRY

Baldacci, P., A. Canuti, and G. Coppiardi
Industrie alimentari 11, No. 2, 51-58 (1972) (In Italian)
BFMIRA Abstracts 25, No. 10, Abstract No. 3749, 750 (Oct. 1972)

Discussion and review with 28 references. C.C. Reprinted

9.19 WASTE CONTROL CAN BE COSTLY -- PLAN CAREFULLY

Some of the outlets for utilizations of animal by-products are briefly described as well as some methods of waste treatment. The costs quoted are for the US meat industry. (From a paper read at the 31st meeting of the National Independent Meat Packers Association, 11-13th May 1972, Chicago.) C.C.E. Reprinted

Brown, W. L.
Nat. Provis. 166, No. 23, 114-119 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3777, 755 (Oct. 1972)

9.19 (0.5)

MICROBIAL POPULATION OF FEEDLOT WASTE AND ASSOCIATED SITES

Rhodes, R. A., and G. R. Hrubant (Northern Regional Research Laboratory, Northern Marketing and Nutrition Research Division, ARS, U.S. Department of Agriculture, Peoria, IL 61604)
Applied Microbiology 24, No. 3, 369-377 (Sept. 1972)

Livestock wastes present a major problem from the standpoint of disposal and inherent pollution hazard. As part of a study on the utilization of feedlot waste (FLW), the authors examined the microbiological flora of feedlot wastes and associated sites. Quantitative microbiological determinations were made bimonthly for a year of the flora of beef cattle waste and runoff at a medium-sized midwestern feedlot.

The feedlot waste contained (per gram of dry weight) 10^{10} total organisms, 10^9 anaerobes, 10^8 gram-negative bacteria, 10^7 coliforms, 10^6 sporeformers, and 10^5 yeasts, fungi, and streptomycetes. The numbers and patterns of the groups of organisms varied slightly over the year in spite of a wide variation in weather. Little microbial growth occurs in the waste as it exists in the feedlot. The runoff from the pens showed the same microbial population pattern. Apparently the fungi, especially streptomycetes, are associated with final stabilization of the waste. Although yeasts are the dominant organisms in the ensiled corn fed the cattle, they do not occur in large numbers in the animal waste. Water from large ditches receiving runoff and subsurface water from the fields had a microbial population similar to the runoff but showed lower level of coliforms.

(over)

9.19 (0.5)

ENTEROBACTERIA IN FEEDLOT WASTE AND RUNOFF

Hrubant, G. R., R. V. Daugherty, and R. A. Rhodes (Northern Regional Research Laboratory, ARS, U.S. Department of Agriculture, Peoria, IL 61604)
Applied Microbiology 24, No. 3, 378-383 (Sept. 1972)

The waste and runoff from cattle feedlots may represent a serious pollution hazard. Furthermore, refeeding of wastes is being studied as a means of disposing of the increasing accumulation of waste from intensive animal production. In another report in the same issue of this journal [Appl. Microbiol. 24, No. 3, 369-377 (1972)] R. A. Rhodes and G. R. Hrubant enumerated and categorized the microflora of FLW (feed lot waste). In the present study, FLW and runoff were examined for Enterobacteriaceae. In addition to samples of FLW and runoff from the pens, samples of water from a large drainage ditch at the feedlot were examined. The drainage ditch received the runoff but contained primarily subsurface drainage from fields on which FLW was spread for disposal.

Five hundred and fifty-three cultures of enterobacteria were isolated by plating and enrichment techniques employing seven different media.

The FLW samples contained about 50 million enterobacteria per gram dry weight, 90% of which were Escherichia coli (nonenteropathogenic types). Citrobacter spp. and Enterobacter cloacae were present in moderate amounts. Enterobacter aerogenes, Klebsiella, Providencia stuartii, Arizona, four species of Proteus, and Salmonella (serological group C_2) were also isolated. No Shigella were found. The same bacterial pattern was found in the runoff and the drainage ditch

(over)

9.2 (1.12)

COSTS AND EARNINGS OF TUNA VESSELS IN HAWAII

Ahsan, Abu Ekram, John L. Ball, Jr., and Jack R. Davidson (University of Hawaii)
University of Hawaii Sea Grant Program Report AR-72-01, NOAA Grant No. 2-35243, 22 pp. (July 1972). No price.

Of Hawaii's fisheries the high-sea or pelagic fishery is mainly directed to catching tuna which is the most significant component of the Hawaiian fishing industry. The tuna fishery is divided into pole and line fishing for skipjack tuna (called "aku") and longline fishing for other tuna (called "ahi"), for example yellowfin, big eye, and albacore.

For aku and ahi fisheries, boats were grouped into three categories--high, average, and low earning--on the basis of their gross earnings. The amount of fishing effort accounted for most of the differences in income among the three groups.

Ths costs of fishing were divided into two categories: (1) average annual expenses (AAE); and (2) operating expenses (OE). These expenses for each type of boat are listed in the following table.

Boat	High earning (HE)		Average earning (AE)		Low earning (LE)	
	AAE	OE	AAE	OE	AAE	OE
Aku	$36,571	$19,461	$20,867	$16,815	$19,210	$14,242
Ahi	$10,943	$18,295	$ 9,123	$14,357	$ 7,824	$ 8,968

(over)

9.3

EMERGING LAW OF THE SEA: ISSUES IN THE MARIANA ISLANDS

Nordquist, Myron H. (U.S. Dept. of State, Ocean Affairs Section, Washington, D.C.) and Amanda Lee Moore (National Law Center, George Washington University, Washington, DC 20006)
Journal of International Law and Economics 7, No. 1, 43-59 (June 1972) (National Law Center, George Washington University, Washington, DC 20006)

The Congress of Micronesia passed on 20 February 1972 an exclusive fishing zone law. The law was modeled on legislation of the United States, and it essentially seeks to establish a 9-mile exclusive fisheries zone contiguous to a 3-mile territorial sea. As distant water fishing techniques and deepwater mineral exploration capabilities advance, increasing pressures can be expected for greater control over offshore resources near islands. The number of islands, inlets, reefs, and semisubmerged geographical features located throughout the world is vast; if each were accorded a territorial sea and ocean resource entitlement on the same basis as if it were a continent, the worldwide implications would be staggering. The objectives of this article were: (1) to describe the legal status, governmental organization, geography, and economy of the Trust Territory of the Pacific, particularly the Mariana Islands; and (2) to present the general legal arrangements for the Trust Territories and then to examine several law-of-the-sea issues as they relate to the unique circumstances of the Mariana Islands.

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19 (0.5)

water but there were fewer enterobacteria. No Salmonella or Arizona were found in the runoff and drainage ditch water.

The authors conclude that feedlot wastes do have public health significance. [6 tables, 12 references] FTP

9.3

If residents of the Mariana Islands are to look to the sea for supplementary supplies of natural resources, it would be highly desirable to ascertain the present state of the law that would govern any offshore exploitation activity. The authors reviewed relevant U.S. legislation and treaties that would be applicable to the circumstances of the Trust Territories.

For example, it appears that the (United States) Submerged Lands Act and the Outer Continental Lands Act statutes do not apply to the Trust Territories. Both of these laws refer to the State boundary for the commencement of their regulation; the statutes define this as the State of the Union, thus excludes the Trust Territory. Also, the Convention on the Continental Lands confers sovereign rights over the natural resources of the Continental Shelf adjacent to the coastal states, but this multilateral treaty has not been interpreted as being applicable to the Trust Territories. Further, there appears to be a potentially important difference between the Trust Territory Code definition of the breadth of territorial waters and Article II of the Convention on the Territorial Sea and the Contiguous Zone. The Trust Territory Code permits a more generous recognition of basepoints than does the Convention.

Apparently the midoceanic islands have generated many issues for the law-of-the-sea conference in 1973.
[78 footnotes] FTP

The atmosphere is considered by some to be an insignificant source of carb dioxide for the production of phytoplankton. The present workers found, howeve that by adding phosphorus (as Na_2HPO_4) and nitrogen (as $NaNO_3$) to a small lake having low concentrations of natural dissolved inorganic carbon, the phytoplank ton standing crop was increased by two orders of magnitude. The artificially e riched lake appeared to have obtained the carbon necessary to produce algal bio from the atmosphere. The authors conclude that the invasion of CO_2 from the at mosphere is likely to be sufficient for the eutrophication of any lake receiving sufficient supplies of nitrogen and phosphorus.
[1 figure, 1 table, 14 references] FTI

9.19 ATMOSPHERIC CARBON DIOXIDE: ITS ROLE IN MAINTAINING PHYTOPLANKTON STANDING CROPS

Schindler, D. W., and G. J. Brunskill (Freshwater Institute of the Fisheries Re search Board of Canada, 501 University Crescent, Winnipeg 19, Manitoba, R3 2N6, Canada), S. Emerson, W. S. Broecker, and T.-H. Peng
Science 177, No. 4055, 1192-1194 (Sept. 29, 1972)

(0.5)

Future reports on this study will deal with the characterization of representative isolates of all groups of microorganisms in terms of their possible dissal or utilization of FLW.
figures, 1 table, 14 references] FTP

9.2 (1.12)

Average annual expenses are higher for aku boats than for ahi boats and are due to differences in costs of repair and maintenance. In operating expenses, the highest cost item in the aku boats was for fuel and oil; the highest cost item for ahi boats was for bait.

The aku owners' average annual income (before taxes) was $20,691 for HE boats, $9,258 for AE boats, and $4,269 for LE boats. These figures represent about 21.6%, 9.8%, and 4.6%, respectively, of the estimated current replacement cost of a similar boat (excluding equipment). For ahi boat owners, the average annual income (before taxes) was much lower than for aku boat owners. The estimated hourly earning of aku fishermen for the three earning groups was $1.71. For ahi fishermen the average annual income was $4,422, $3,548, and $1,837 for HE, AE, and LE boats, respectively. These earnings are much lower than wages in other industries and discourage employment. The low earnings of ahi boat owners and fishermen appear to be the major factors restricting this industry.

There are a number of State and Federal loan programs designed to encourage investment in the fishing industry. Only two owners obtained loans from the State program for constructing new vessels, and only three persons obtained loans under the Federal programs. Restrictive prerequisites in the past, the high risks involved in the tuna fishery, and the low earnings of most of the boats have discouraged fishermen from long-term investment in boats and equipment.

Most of the tuna boats are more than 20 years old, which detrimentally affects range, efficiency, and fishing effort--the prime variables in determining income and return on investment. Growth in the tuna industry depends upon introduction of new boats which will increase productivity and give better returns on investment. [2 figures, 14 tables, 14 references] SW

Apparatus for the sterilization and evaporation of the water content of butchers' offal, meat, feathers, blood, and fish waste is described. Reprinte

Stord Bartz Industri A/S (Norway) (pat.)
British Patent 1,286,778
BFMIRA Abstracts 25, No. 10, Abstract No. 3858, 771 (Oct. 1972)

9.19 IMPROVEMENTS IN OR RELATING TO THE PROCESSING OF ANIMAL MATERIAL COMPOSITIONS

9.19 MICROBIAL DEGRADATION OF CRUDE OIL: FACTORS AFFECTING THE DISPERSION IN SEA WATER BY MIXED AND PURE CULTURES

Reisfeld, Abraham, Eugene Rosenberg, and David Gutnick (Dept. of Microbiology, Tel Aviv University, Tel Aviv, Israel)
Applied Microbiology 24, No. 3, 363-368 (Sept. 1972)

During the course of a study of the factors which influence the kinetics of microbial dispersion of crude oil in sea water, a pure culture (one of eight isolated) capable of bringing about a rapid dispersion and extensive degradation of oil was isolated. The dispersion of crude oil by this bacterium (a member of the genus Arthrobacter) was dependent upon sources of exogenous nitrogen and phosphorus and was completely inhibited by 10^{-2} M azide. Acidic conditions were not necessary for oil dispersion. When sea water was supplemented with 0.029 mM K_2HPO_4 and 3.8 mM $(NH_4)_2SO_4$ and inoculated with the organism, oil dispersion occurred within 1 day. The strict requirement for nitrogen and phosphorus supplementation suggests that the use of microorganisms in the treatment of oil pollution must be limited to situations in which the polluting oil is confined.
[4 figures, 4 tables, 14 references] FTP

9.3 CANADIAN CLAIMS IN ARCTIC WATERS

Dellapenna, Joseph W. (Law Department, Willamette University, Salem, Ore.)
Land and Water Law Review 7, No. 2, 343-420 (1972) (College of Law, University of Wyoming, Laramie, WY 82070)

In this article, the author analyzes various theories of international law which might reconcile the conflicting interests of Canada and other nations in Arctic waters. These interests involve aspirations to exploit the Arctic waters either for their natural resources or for navigation. The author concludes that, to date, Canada's asserted claims in Arctic waters have been too broad, and further he indicates that there are other more limited methods of protecting legitimate Canadian interests. The sections of the article deal with: I. The Canadian Arctic; II. The Competing Interests; III. Alternative Solutions (A. International Regulation of Arctic Pollution, B. The Marginal Belt, C. Historic Waters, D. Contiguous Zones, E. Straight Baselines, and F. Sectors); and IV. Conclusion. The author believes that a system of straight baseline running along the outer edges of the Canadian mainland and islands as limited by the Convention of the Territorial Sea would be a more reasonable, but still effective, solution to the Canadian anxiety over the Arctic environment and control of their national sea route. [201 footnotes] FTP

9.19 LEAD CONTENT OF HUMAN HAIR (1871-1971)

Weiss, D., B. Whitten, and D. Leddy (Michigan Technological University, Houghton, MI 49931)
Science 178, No. 4056, 69-70 (Oct. 6, 1972)

Atmospheric levels of lead have risen steadily since 1940 [D. Jenkins, Smithsonian 3, 62 (1972)]. Quantative data on the effect of lead on the population prior to the introduction of tetraethyl lead into gasoline in 1923 are not available. The present article reports on the analysis for lead of antique hair (removed from persons between 1871 and 1923) and contemporary hair (from rural and urban populations in 1971). They found that the lead content per unit weight of hair was significantly higher in the antique population than in present day populations. Apparently, the lead content of human hair has decreased between the period 1871-1923 and 1971 in spite of an increase in the level of lead in the atmosphere.
[2 tables, 13 references] FTP

9.3 INTERNATIONAL CONTROL OF RIVER WATER POLLUTION

Witaschek, Fred V.
Denver Journal of International Law and Policy 2, No. 1, 35-54 (Spring 1972) (University of Denver College of Law, Denver, CO 80210)

The author presents some technical and administrative suggestions for controlling the pollution of international rivers. He believes that current technological developments will enable the doctrine of equitable utilization to be more accurately implemented. And, he concludes that once technology demonstrates the capability of coping with pollution, criticism of administration will be replaced by active support.
[29 footnotes] FTP

9.3 THE PREPARATION OF ARTICLE 1 OF THE CONVENTION ON THE CONTINENTAL SHELF

Oxman, Bernard H.
Journal of Maritime Law and Commerce 3, No. 3, 445-472 (Apr. 1972)

This is the second of three parts of a study on the subject by the author and deals with the Ciudad Trujillo Conference; part 1 appeared in the January issue of this journal. [57 footnotes] FTP

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FOREWORD

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0.116 (9.3)

APPARATUS FOR AUTOMATED GEL PERMEATION CLEANUP FOR PESTICIDE RESIDUE ANALYSIS. APPLICATIONS TO FISH LIPIDS

Tindle, Roger C., and David L. Stalling (Fish-Pesticide Research Laboratory, Columbia, MO 65201)
Analytical Chemistry 44, No. 11, 1768-1773 (Sept. 1972)

In the analysis of sample extracts for pesticide residues, separation of lipids is often time consuming. Automating analyses for pesticides would improve precision, decrease sample losses, and save labor. The basic analytical technique, however, must be amenable to automation.

Previously, the authors reported a gel permeation cleanup procedure for separation of pesticides from lipids in sample extracts (J. Assn. Offic. Anal. Chem. 55, 32-38 (1972)). Because of the long elution time required by the procedure the authors believe that it is not entirely practical for manual operation. The procedure lends itself to automation, in the authors' view.

In this article, the authors describe an automated gel permeation chromatography system which consists of a solvent source and pump, a manual loading valve, a remotely controllable sample introduction system, a chromatography column, and a remotely controllable sample collection system. The system is capable of either manual or automatic control of sample introduction and sample collection. An external digital controller allows automatic unattended operation of the system for periods up to 24 hr.

The procedure was found to be extremely reproducible provided limits of lipid concentration and flow rates of the original (manual) procedure are observed. Cross contamination of samples was negligible. Simulated sample extracts were

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DEVELOPMENT OF A LABORATORY-SCALE RECIPROCATING PLATE EXTRACTION COLUMN

Lo, Teh C., and Andrew E. Karr (Hoffmann-La Roche Inc., Nutley, NJ 07110)
Industrial & Engineering Chemistry, Process Design and Development 11, No. 4, 495-501 (Oct. 1972)

Data are given on a laboratory-scale, open-type perforated reciprocating-plate extraction column. The column consists of a series of open-type perforated plates mounted on a central shaft. The shaft (and plates) is reciprocated by a simple drive mechanism at the top of the column. The column consists of 1-in. (internal diameter) Pyrex pipe; plates are punched out of 1/16-in. Teflon sheet; they have a free area of about 50%. The mechanism is driven by a 1/70-hp. motor.

A methyl isobutyl ketone-acetic acid-water system was tested; the solute was first extracted from the aqueous solution by the methyl isobutyl ketone phase, and in the following run, the solute was extracted from the organic phase by the aqueous phase. The plates were spaced 1-in. apart. A constant amplitude of 1/2-in. was used. Variables studied were reciprocating speed [strokes per minutes (SPM)] and throughput.

Using the methyl isobutyl ketone-acetic acid-water system, a minimum height of an equivalent theoretical stage (HETS) of 2.8-in. volumetric efficiencies of up to 532 hr^{-1} were achieved in the 1-in. diameter column. The column had the lowest HETS and the highest volumetric efficiency than those reported of other columns (mechanically aided).

At a given throughput, the HETS did not pass through a minimum; rather, it decreased as the speed of reciprocation increased until flooding occurred. This

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0.118 (7.0)

MERCURY DETECTION BY MEANS OF THIN GOLD FILMS

McNerney, John J., Peter R. Buseck (Depts. of Chemistry and Geology, Arizona State University, Tempe, AR 85281), and Roland C. Hanson
Science 178, No. 4061, 611-612 (Nov. 10, 1972)

Most semiportable instruments for detecting low concentrations of mercury (Hg) have relied on the atomic absorption technique. A serious limitation of these instruments is the presence of interfering substances such as moisture, ozone, sulfur dioxide, and a variety of organic compounds and fine particulates.

The authors have developed an extremely sensitive and portable Hg detector based on the phenomenon that a thin layer gold (Au) film undergoes a significant increase in resistance upon adsorption of Hg vapor. The resistance increase is linear in nanogram concentrations of mercury.

Gold films were prepared on ceramic or glass substrates in a conventional high-vacuum system with the use of a chromium underlayer and no substrate heating. After preparation, the films were annealed in the atmosphere at 150° C. The film resistances ranged from 300 to 1,500 ohms.

As shown in figure 1, two films of equal resistance are used, one as a sensor and the other as a reference. They are contained in a plexiglass chamber which guides a constant flow of gas over the films. The films are connected into opposite arms of a simple d-c bridge circuit and balanced. Carrier gas, normally air, is filtered through activated charcoal before pickup of sample material and passed over the gold films. Mercury from solid samples may be liberated in furnace 1, after treatment. If the sample is already a vapor it may be injected at point 2.

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0.32 (0.7)

INTERACTIONS OF SOME WOOD SMOKE COMPONENTS WITH ε-AMINO GROUPS IN PROTEINS

Chen, Lan-Bo, and Phillip Issenberg (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Agricultural and Food Chemistry 20, No. 6, 1113-1115 (Nov.-Dec. 1972)

In the United States, commercial smoking of foods is primarily for flavor and color, but some extension of shelf life of the food may occur. The preservative effect of wood smoking of foods results from partial dehydration of the surface of the food and from deposition of smoke components with antimicrobial and antioxidant activity. Because of our concern about the nutritional value of processed foods and about chemicals added to foods, we should know the identities and amounts of smoke components consumed as well as the nature of the reaction products formed when foods are exposed to smoke. Many of the components of wood smoke have been identified but there is limited information on the chemical reactions in smoked foods or on the reaction products. The present study was concerned with the extent to which some specific wood smoke components react with ε-amino groups of lysine in protein and to determine the significance of these components in causing the loss of available lysine during the smoking process. The authors wanted to find out whether the interaction of proteins with coniferaldehyde and sinapaldehyde (major phenolic components of wood smoke condensates) could account for the inability to recover these compounds from smoked food products.

Uncured lean beef sirloin strips were exposed to wood smoke for 10 hr. The smoked strips had lost 44% of the available lysine initially present. Heating the

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0.117 (6.113)

characteristic, the authors state, is highly desirable because it provides a straightforward means of selecting optimum speed of reciprocation.

The column was suitable for processing mixtures that tend to emulsify and for processing liquids containing suspended solids. The extraction column is simple in construction and easy to operate and maintain. Furthermore, it is highly versatile--reciprocating speed, amplitude, and plate spacing can be readily changed to provide optimum process performance.

[7 figures, 4 tables, 28 references] FTP

0.117 A MICROMETHOD TO GENERATE AND COLLECT ODOR CONSTITUENTS (4.11) FROM HEATED COOKING OILS

Selke, E., W. K. Rohwedder, and H. J. Dutton (Northern Regional Research Laboratory, U.S. Department of Agriculture, Peoria, IL 61604)
Journal of the American Oil Chemists' Society 49, No. 11, 636-640 (Nov. 1972)

A stainless-steel reactor, about one-millionth of the volume of a home kitchen was built to generate odors from cooking oils heated to deep fat frying temperatures. The volatiles can be collected from 1-5 ml. of heated oils (193° C.) directly on a gas chromatographic column, cooled to -60° C., and then separated by temperature programming up to 250° C. The design has provisions for three independent means of effluent monitoring--flame ionization detection, odor analyses, and mass spectrometry.

[2 figures, 2 tables, 15 references] FTP

0.116 (9.3)

prepared in cyclohexane to determine recoveries and precision. Each 5 ml. sample contained 250 mg. of corn oil in addition to mixtures of pesticides. Concentrations of lipid and pesticide simulated those frequently encountered in actual extracts of whole ground fish where 1 ml. of sample represents 1 g. of fish. Aliquots of a prepared solution were independently processed in the automated system. The small values for the standard errors (0.02 to 0.06) and coefficients of variation (2.2 to 3.6%) indicate that the system gave reproducible results.

Any technique that uses only one solvent throughout sample addition and elution could be adapted to this system without significant modification. A flow diagram and an electrical schematic of the system are included.

[2 figures, 3 tables, 12 references] SW

0.3 FISHERMAN'S SOAP

Hoffman, Paul, and John D. Hodge, Jr. (pat.)
U.S. Patent 3,650,968 (Mar. 21, 1972)
Chemical Abstracts 77, No. 4, 22015a (July 24, 1972)

0.32 (0.7)

sirloin strips in air at 65° C. for 10 hr. resulted in a 15% loss in available lysine.

Homogenated samples of the lean beef were treated with acidic, phenolic, or neutral fractions of smoke condensate; they lost 14%, 38%, and 45% of their available lysine, respectively.

A model system was prepared using a soluble protein, bovine serum albumin. It was treated with pure wood smoke components and the degree of interaction was determined spectrophotometrically by measuring the extent to which the protein reacted with dinitrobenzyl sulfonate. The selected chemicals were sinapaldehyde, coniferaldehyde, formaldehyde, glyoxal, pyruvaldehyde, furfural, and furfuryl alcohol. A reduction in available ϵ-amino groups occurred when bovine serum albumin was treated with coniferaldehyde and sinapaldehyde; the reduction was comparable to that obtained for some previously known active aldehydes (formaldehyde, glyoxal, pyruvaldehyde, and furfural). Bovine serum albumin treated with phenol, cyclotene, eugenol, or syringol showed no significantly detectable interaction.

When casein was treated with aldehydes and phenolic aldehydes, a variety of colors, ranging from yellow to red, was produced.

[1 figure, 4 tables, 25 references] FTP

0.118 (7.0)

The vapor from either source is then surged into the flow path by the carrier gas. Before the gas enters the film chamber, it is scrubbed of moisture and H_2S in a filter train containing magnesium perchlorate and ascarite. In addition, air entering the reference chamber is first scrubbed free of Hg in a chamber containing palladium chloride.

The film produced a linear change in resistance for amounts of Hg ranging from 5×10^{-11} to 1×10^{-7}. Larger amounts produced nonlinear responses because of the saturation of the gold film surface. By heating to 150° C. for 10 min. the gold film can be cleaned of adsorbed Hg.

[1 figure, 1 table, 11 references] SW

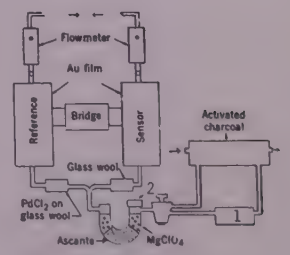

Fig. 1 Flow path of the instrument.

0.32
(0.7)

PROCESSING DAMAGE TO PROTEIN FOOD. A REVIEW

Bender, A. E. (Queen Elizabeth College, London University, London, England)
Journal of Food Technology 7, No. 3, 239-250 (Sept. 1972)

A consideration of the effects of processing treatment on the nutritive value of protein foods must be conditioned by three principles. First, a food must comprise a reasonable proportion of the diet for any change in its nutritive value to be of any consequence. (For example, certain processes cause considerable destruction to the protein of breakfast cereals, but the amount of such foods normally eaten contribute so little protein that the dietary effect of the damage is insignificant.) Second, the inadequacies of the biological assay methods of determining nutritive value may lead to inaccurate conclusions. (For example, the amino acids methionine plus cystine are limiting in fish meals, so if the amount of available lysine is reduced the biological assay methods will show no change until the damage is severe enough to make lysine limiting.) Third, it appears that many diets are limited by the sulfur amino acids; therefore, the Maillard reaction, involving lysine, may be of interest only when it is limiting in the diet as a whole.

Although foods undergo many processes (heating, drying, irradiation, freezing, chemical treatment, and storage), the heating process has the most important effect on protein quality. However, heating can be both beneficial and detrimental. The nutritive value of most legumes are improved by heating (partly due to destruction of trypsin inhibitors and toxic materials, and partly due to improvement

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0.35

LOCATION OF LIPID-SOLUBLE SELENIUM IN MARINE FISH TO THE LIPOPROTEINS

Lunde, Gulbrand (Central Institute for Industrial Research, Forskningsveien 1, Blindern, Oslo 3, Norway)
Journal of the Science of Food and Agriculture 23, No. 8, 987-994 (Aug. 1972)

Marine oils contain from 0.1 to 2.0 p.p.m. of selenium, and the selenium is present as a lipid-soluble organic selenium compound of a polar character. The purpose of the present study was to determine whether this compound is bound to the lipid phase in the high molecular weight fraction (a part of the lipoprotein complex) of marine oils.

Apparently, the lipid-soluble selenium compound is enriched in the high molecular weight (m.w. $\geq$ 5,000) extracts of the fish. The selenium compound is enriched in the oil extracted from fish by a mixture of nonpolar and polar organic solvents (hexane-isopropanol), but the selenium is also present in oil samples extracted with nonpolar solvents (hexane) only or by treatment with water at 60° C. Stored raw fish gradually deteriorates and the selenium content in the oil produced by boiling the raw fish material increases with time.

The results indicate that part of the lipid-soluble selenium is bound as a lipoprotein, but some of it is either bound relatively weakly or exists free in the lipid phase. The selenium content of marine oils prepared from fish of various storage ages is shown in the table that follows.

(over)

0.35

EFFECT OF INORGANIC SALTS ON THE STRENGTH OF MUSCLE FIBERS

Nakamura, Ryo (Laboratory of Food Science and Technology, Animal Products, Faculty of Agriculture, Nagoya University, Nagoya, Japan)
Journal of Agricultural and Food Chemistry 20, No. 6, 1167-1169 (Nov.-Dec. 1972)

In earlier work, the author found that the tensile strength of muscle fibers decreased during postmortem aging and that it decreased in the presence of small amounts of Ca ions. These results suggested that the cause of the changes in the tensile strength of the muscle fibers might be the Ca ions released from muscles during postmortem aging. In the present study, the effect of inorganic salts on the strength of muscle fibers was examined. Tensile strength was measured about the muscle fibers prepared from the chicken pectoralis major muscles after incubation with various kinds of salt solutions. The various salts considered were NaCl, KCl, KI, KNO_3, CH_3COOK, K_2SO_4 , K-tartrate, K_2HPO_4, KH_2PO_4, Na-tripolyphosphate, Na-hexametaphosphate, LiCl, $CaCl_2$, $MgCl_2$, and $BaCl_2$.

Between pH 5.0 and 8.0 the tensile strength of the muscle fibers changed little. The monovalent cations and most of the anions had a relatively small effect. The divalent cations and phosphates decreased greatly the tensile strength of muscle fibers. A similar effect of the divalent cations and phosphates was found in an experiment involving the rehydration of the lyophilized muscles in these salt solutions.

[1 figure, 5 tables, 7 references] FTP

0.35

CHARACTERIZATION OF THE COPPER-BINDING OF PHOSPHATIDYL ETHANOLAMINE EMULSION IN ITS RAPID AUTOXIDATION

Morita, Makio, and Masao Fujimaki (Dept. of Agricultural Chemistry, Faculty of Agriculture, University of Tokyo, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 10, 1751-1754 (Oct. 1972)

In earlier work [Agr. Biol. Chem. 36, 1163 (1972)], the authors found that copper catalyzes the oxygen uptake of phospholipids, especially phosphatidyl ethanolamine (measured by Warburg's manometry). In the present study, it was found that EDTA (ethylenediaminetetraacetic acid) added to a phosphatidyl ethanolamine emulsion inactivated copper stoichiometrically in molar ratio of 1:1. However, monoethanolamine, α-glycerophosphoric acid, O-phosphorylethanolamine, and glyceryl phosphoryl ethanolamine did not. Iminodiacetic acid depressed oxygen uptake of phosphatidyl ethanolamine. The authors conclude that the reason why copper tends to accumulate in the phospholipid fraction of certain systems (food or biological tissue) and to promote their oxidation may be the chelatelike high affinity of the phosphatidyl ethanolamine interface.

[2 figures, 1 table, 8 references] FTP

0.12 (0.8) MEMBRANE SEPARATION PROCESSES

Lacey, Robert E. (Southern Research Institute, 2000 Ninth Ave. South, Birmingham, AL 35205)
Chemical Engineering 79, No. 19, 56-74 (Sept. 4, 1972)

The author describes electrodialysis, reverse osmosis, and ultrafiltration techniques of membrane separation processes. One section deals with the various types of membranes used and another section describes the various processes.

Separation processes can be used for demineralization (for example, removal of minerals from sugar solutions and from whey), concentration of salts (production of concentrated brine from sea water), and separation of small solid particles from solutes (treatment of industrial wastes, recovery of protein from soy whey). Future applications of ultrafiltration might include the concentrating and desalting of enzymes, concentrating egg albumin, recovering valuable protein products from soybean whey and packinghouse blood, dewatering biological sewage sludges, or treating wastes from metal finishing operations. Reverse osmosis might be used to produce fruit juice concentrates with improved flavor, recovery of metals in the metal-plating industry, or removing and recovering materials from the dilute wastes of the pulp and paper industry. Electrodialysis might be used to preconcentrate solutions of electrolytes prior to spray or drum drying, to separate certain ions in dilute waste streams, or to de-ash organic products such as glycerol or sorbitol.

Copies of this report are available from the publisher, Chemical Engineering, International Data Processing Center, 121 South Gertrude Ave., Paramus, NJ 07652. Price $2.00, order number 162.
[27 figures, 4 tables, 68 references] FTP

0.6 EXPANDED PROTEIN PRODUCTS

Ralston Purina Co. (A. A. Schulz, E. V. Oborsh, and A. V. Brown) (U.S.A.) (pat.)
British Patent 1,271,173
BFMIRA Abstracts 25, No. 7, Abstract No. 2328, 470 (July 1972)

An expanded protein product, in the form of a gel, having texture and moisture stability is reported. Reprinted

0.32 (0.7)

in the digestibility and availability of the sulfur amino acids). Heat damage to proteins can involve destruction of amino acids by oxidation, loss of palatability, modification of amino-acid linkages resulting in delayed release during digestion, and formation of linkages that are not hydrolyzed during digestion.

The author reviews some of the literature on the processing damage to the protein of foods. Apparently, the variations between experimental conditions used by different research workers can account for the differences in their results on the protein quality of foodstuffs. Similarly, variations in processing procedures in commercial plants can account for the variations in protein quality of foodstuffs. Although conditions for producing foodstuff with the minimum of damage to protein quality have been established, these conditions may be difficult to control in commercial manufacturing processes.
[76 references] FTP

0.35

Fish sample	Storage time	Selenium content	Storage time	Selenium content	Storage time	Selenium content
	days	p.p.m.	days	p.p.m.	days	p.p.m.
Capelin	2	0.05	5	0.08	7	0.11
Herring	3	0.11	6	0.17	8	0.21
Mackerel	2	0.09	5	0.22	7	0.28

[3 figures, 3 tables, 4 references] FTP

0.321 STRUCTURE OF A CALCIUM-BINDING PROTEIN FROM CARP MUSCLE

Kretsinger, Robert H., Clive E. Nockolds, Carole J. Coffee, and Ralph A. Bradshaw (Dep. Biol., Univ. Virginia, Charlottesville, Va.)
Chemical Abstracts 76, No. 23, 137197h (June 5, 1972)

0.36 (9.1) RECENT PROGRESS IN RESEARCH ON THE UROPHYSIS

Lederis, K. (Fac. Med., Univ. Calgary, Calgary, Alberta, Canada)
Chemical Abstracts 77, No. 9, 56830c (Aug. 28, 1972)

0.6 (0.7) SATURATED SALT SOLUTION PREPARED BY EVAPORATING SEA WATER

Abeille, Elzear
French Patent 2,082,097 (Jan. 14, 1972)
Chemical Abstracts 77, No. 13, 86773d (Sept. 25, 1972)

0.4 METABOLIC INTERACTIONS AMONG ENVIRONMENTAL CHEMICALS AND DRUGS

Conney, A. H. (Dept. of Biochemistry and Drug Metabolism, Hoffmann-La Roche Inc., Nutley, NJ 07110), and J. J. Burns
Science 178, No. 4061, 576-586 (Nov. 10, 1972)

Metabolic interactions occur among ingested drugs, insecticides, food additives, carcinogenic hydrocarbons, and a variety of environmental chemicals. These effects are due to the versatile nature of the liver microsomal enzymes. The microsomal enzymes can metabolize chemicals with diverse structures and biological activities; furthermore, these enzymes can be stimulated or inhibited by other chemicals administered simultaneously. The authors gave examples of interaction.

In attempts to increase the incidence of cancer in rats, they were fed two carcinogens simultaneously. Results showed that the activity of the liver carcinogen 3'-methyl-4-dimethylaminoazobenzene was abolished when this aminoazo dye was fed simultaneously with the carcinogenic, polycyclic hydrocarbon, 3-methylcholanthrene. The inhibition of carcinogen activity was found to be caused by the 3-methylcholanthrene induced synthesis of liver microsomal enzymes that metabolized aminoazo dyes by N-demethylation and azo link reduction to noncarcinogenic products.

Patients who control diabetes with tolbutamide may be exposed to serious hypoglycemia if they also take drugs such as phenylbutazone, sulfaphenazole, phenyramidol, bishydroxycoumarin, and chloramphenicol. These drugs inhibit the metabolic inactivation of tolbutamide in man.

Phenobarbital decreases the action of other drugs by increasing the rate at which they are metabolized to inactive substances. Several hundred other drugs,

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0.5 (9.15)(9.16) INADEQUACY OF AQUARIUM ANTIBACTERIAL FORMULATIONS FOR THE INHIBITION OF POTENTIAL PATHOGENS OF FRESHWATER FISH

Trust, T. J. (Dept. of Bacteriology and Biochemistry, University of Victoria, Victoria, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 10, 1425-1430 (Oct. 1972)

Many species of tropical fishes are used not only in home aquaria but in certain areas of biological research. These fish are susceptible to bacterial infections, the most frequent of which are fin and tail rot, furunculosis, gill infections, piscine mycobacteriosis, columnaris disease, and infectious hemmorhagic septicemia. In this study, the effectiveness of 14 commercial products against a number of the species of bacteria that are pathogenic for fishes was examined. The antibacterial activity of the formulations was determined by standard bacteriological assay methods and by bioassay. The test organisms were Aeromonas liquefaciens, A. salmonicida, Chrondrococcus columnaris, Mycobacterium marinum, Pseudomonas putida, P. aeruginosa, Staphylococcus aureus, and Bacillus subtilis. The bacteriostatic activity of the products was determined by serial dilution using the method of F. Kavanagh [In Analytical Microbiology, F. Kavanagh (ed.), Academic Press Inc., New York, N.Y. (1963), pp. 125-140]. The bactericidal assays were made by the Phenol Coefficient-Official Final Action Method of the Association of Official Analytical Chemists [Official Methods of Analysis of the AOAC, 11th ed. (1970), pp. 63-67, 754]. The bactericidal activity of the products in aquaria holding fish (goldfish and guppies) was tested using one, two, and four times the concentration recommended by the manufacturers. The various products

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0.6 FOOD USES OF TRITICALE

Lorenz, K. (Dept. of Food Science and Nutrition, Colorado State University, Fort Collins, CO 80521)
Food Technology 26, No. 11, 66, 68, 70, 72, 74 (Nov. 1972)

Triticale is a cereal grain produced by cross-breeding wheat and rye. It is a good potential source of protein and lysine. This article deals with the composition, characteristics, and potential uses of triticale, and gives data on its use in bread, rolls, and noodles. Some characteristics of the 1971 crop of triticale and wheat are shown in the table that follows.

Item	Grain	Flour		
	Protein [1]	Protein [1]	Ash [1]	Yield
	%	%	%	%
Spring triticale	15.7	12.7	0.54	61.9
Spring wheat	14.3	14.0	0.46	69.1
Winter triticale	13.1	11.6	0.49	56.4
Winter wheat	12.5	11.7	0.44	66.8

[1] On a 14% moisture basis.

The author states that some triticale lines have higher protein content, better amino-acid balance, and higher protein value than do some wheat varieties. Certain varieties of triticales can be used for preparing American-type white bread; however, changes in the bread dough mixing procedures must be used. The high level of alpha-amylase activity in triticale has an adverse effect on product quality; decreasing this activity results in improvement of baked products. White rye breads, hard rolls, and noodles can be prepared from triticale.
[3 figures, 5 tables, 27 references]

FTP

0.7 (6.54) MEETING OF THE PAG AD HOC WORKING GROUP ON SINGLE CELL PROTEIN

Anonymous
PAG Bull. [FAO/WHO/UNICEF, United Nations, New York, N.Y.], 2, No. 1, 2-5 (1971)
BFMIRA Abstracts 25, No. 5, Abstract No. 1678, 340 (May 1972)

An account of a meeting held during June 1971 at the Institute of Nutrition in Moscow. The problems presented by the adverse effects of nucleic acids ingested in large quantity were briefly discussed together with the nutritional value and potential food uses of single cell protein production is given. L.P.

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0.7 (6.54) SINGLE CELL PROTEIN IN CLINICAL TESTING

Abrahamsson, L., et al.
Nutr. Metabol. 13, Nos. 3-4, 186-199 (1971)
BFMIRA Abstracts 25, No. 5, Abstract No. 1679, 341 (May 1972)

A preparation derived from an unnamed organism grown on a hydrocarbon fraction was given daily to 20 healthy adults as part of a normal diet during six weeks. Dietary studies showed that the distinctive flavour was difficult to accept when the product was eaten daily. Clinical and biochemical investigations showed few side-effects though there was a significant but transient rise in the serum uric acid level in the first 2 weeks. L.P.

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0.5 (9.15)(9.16)

contained a variety of chemicals including sulfanilamide: sulfamethazine; 6,9 diamino-2-ethoxyacridine lactate; 3,6-diamino-10-methyl acridinium chloride; 9 aminoacridine hydrochloride; formaldehyde; methylene blue; sulfathiazole; quinine sulfate; neutral acriflavine; malachite green; sodium sulfathiazole; $KMnO_4$; Ag_2O, and other ingredients not specified.

When the products were used at the level recommended by the manufacturers, they failed to inhibit the growth of the test bacterial species (potential pathogens of tropical fishes) and failed to reduce significantly the numbers of bacteria in water containing fish. The concentrations of the commercial products that were bacteriostatic, bactericidal, or sporicidal were considerably higher than the concentrations recommended by the manufacturers. Two of the products, when used in concentrations higher than that recommended, were found to be inimical to fish. Because certain aquarium fish are used in research work, scientific workers should be aware of the limitations of commercial formulations for use in the therapy and prophylaxis of bacterial infections of these fish.
[3 tables, 18 references] FTP

0.5 RELATIONS OF AUTOTROPHIC AMMONIUM-OXIDIZING BACTERIA TO MARINE SALTS

Finstein, M. S., and Margaret R. Blitzky (Dep. Environ. Sci., Rutgers State Univ., New Brunswick, N.J.)
Chemical Abstracts 76, No. 23, 136254n (June 5, 1972)

0.4

insecticides, carcinogens, steroid hormones, and other chemicals are now known to stimulate drug metabolism in animals, and many of these compounds have been shown to stimulate the metabolism of drugs and normal body constituents in man.

Alcoholics metabolize tolbutamide more rapidly than nonalcoholics. This fact must be taken into consideration in use of the drug for treatment of diabetes. Ethanol stimulates the metabolism of the drug. Alcoholics also metabolize pentobarbital, meprobamate, diphenylhydantoin, warfarin, and antipyrine more rapidly than nonalcoholics. This increased metabolism helps to explain the higher tolerance of alcoholics when sober to barbiturates and other sedatives. A single large dose of ethanol, however, inhibits drug metabolism, and this effect--in addition to the central depressant action of the alcohol--explains the enhanced sensitivity of inebriated individuals to barbiturates and other sedatives.

Halogenated hydrocarbon insecticides also stimulate drug metabolism. These compounds include chlordane, DDT, methoxychlor, aldrin, endrin, dieldrin, heptachlor, and benzene hexachloride. The duration of sleep produced by a dose of pentobarbital in rats given DDT was decreased 25% and 50% with respect to DDT concentrations in fat of 9.4 and 15.5 μg./g. Insects can detoxify pesticides by microsomal hydroxylation. This activity explains differences in resistance of various strains of insects. Steroid metabolism can also be altered by phenobarbital, DDT, and chlordane. Treatment of immature rats with these compounds several days before injection of testosterone inhibits the growth-promoting effect of these androgens on the seminal vesicles. In addition, halogenated hydrocarbon insecticides were found to have estrogenic acitivity in the rat.

The importance of these findings emphasizes the need for a concerted effort by scientists in many disciplines to determine the importance to public health of the interactions that occur among the multitude of environmental chemicals to which we are all exposed. [6 figures, 6 tables, 186 references] SW

0.9 BACTERIAL REDUCTION OF ARSENATE IN SEA WATER

Johnson, David L. (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881)
Nature 240, No. 5375, 44-45 (Nov. 3, 1972)

Arsenic occurs in the ocean primarily as arsenite and arsenate, but they are not in equilibrium. In experiments conducted elsewhere by the author, when sodium arsenite was added to surface Sargasso Sea water, the arsenite should have been completely oxidized to arsenate in a matter of weeks or months, but this reaction did not occur.

Because bacterial reduction had been suggested as a cause of the values of ratios of certain elements in sea water to differ from their equilibrium values, a similar study was conducted for the reduction of arsenate.

Bacterial cultures were obtained from phytoplankton filtered from Narragansett Bay, mixed with about 100 ml. of sterile Sargasso Sea water, and allowed to stand for a few days. The resulting supernatant liquid was inoculated onto sterile media samples composed of Guillard's medium "f" (omitting silicate) diluted with Sargasso Sea water and enriched with sucrose. The medium was aerated, and sodium arsenite and bacteria inoculum in log phase of growth were added.

After 8 hr., arsenate began to be replaced with arsenite, although total arsenic remained constant and no arsenic accumulation by bacteria was evident. After 15 hr., almost all the arsenate had been reduced to arsenite.

Since these experiments have shown that bacterial arsenate reduction has been demonstrated in sea water, the author suggests that such a process may occur in the open ocean and would help explain the arsenite concentrations observed in sea water. [1 figure, 12 references] Lee Thorson

0.6 MEAT, FISH AND POULTRY TREATING (FLAVOURING) PROCESS

Armour and Co. (U.S.A.) (pat.)
British Patent 1,266,162
BFMIRA Abstracts 25, No. 5, Abstract No. 1880, 381 (May 1972)

The object of this invention is a process for treating raw meat (including fish and poultry) with materials to impart flavour to the meat upon cooking. A water-soluble flavouring material is admixed with an edible fat which is the continuous phase. Chilling the meat congeals the fat, holding the water-soluble materials away from the natural juices. Upon cooking the fat melts and releases the flavouring materials to the meat juices. Reprinted

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0.6 MICROBIOLOGICAL PRODUCTION OF PROTEIN FROM OXYGENATED HYDROCARBONS

ESSO Research and Engineering Co. (U.S.A.) (pat.)
British Patent 1,270,027
BFMIRA Abstracts 25, No. 7, Abstract No. 2309, 467 (July 1972)

This invention relates to an aerobic fermentation process for the preparation of a high protein content product. Gram negative bacteria are employed as the microorganisms and alcohol as the oxygenated hydrocarbon acting as the primary carbon source. The product is detoxified after fermentation by acidifying in a pH range of 1.0 to 4.5 and then subjecting it to a temperature in the range 60-141° C. Reprinted

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(1.34)

FORECAST OF THE 1972 PINK SALMON RUNS, SOUTHEASTERN ALASKA

Durley, Kenneth E., and Melvin C. Seibel (Alaska Dept. of Fish and Game, Division of Commercial Fisheries, Juneau, Alaska)
Information Leaflet No. 158, State of Alaska, Dept. of Fish and Game, Juneau, AK 99801 (July 1972), 39 pp.

Annual pink salmon forecasts are important to the fishing industry; they are useful for operational planning and regulatory decision making. This forecast is based on the relation between preemergent fry abundance and subsequent adult return. Mature salmon returning to inshore waters are normally referred to as the "run" or "return." The total run consists of harvest plus escapement. The term escapement refers to those fish which have survived natural and harvest mortalities, reached the spawning grounds and have become part of the spawning population.

To obtain estimates of total escapement each year would be difficult and the cost prohibitive. Instead, an index of escapement is obtained by estimating escapements to a number of streams which receive a large and relatively constant proportion of the total area escapement.

Southeastern Alaska, for the purpose of the forecast, is divided into northern southeastern, and southern southeastern and results in two separate forecasts.

The expected 1972 returns were determined by weighting the percent of the total 1970 escapement returning to each district by the subsequent alevin indices and then applying these percentages to the total run prediction. The 1972 forecast estimates a return of 13.7 million pink salmon to southern southeastern and a return of 12.9 million to northern southeastern for a total return of 26.6

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THE CONNECTIVE TISSUES OF FISH. V. GAPING IN COD OF DIFFERENT SIZES AS INFLUENCED BY A SEASONAL VARIATION IN THE ULTIMATE pH

Love, R. M., M. A. Haq, and G. L. Smith (Torry Research Station, 135 Abbey Road, Aberdeen, Scotland)
Journal of Food Technology 7, No. 3, 281-290 (Sept. 1972)

The appearance of slits across fish fillets is called gaping. It is caused by a weakening of the tissue which holds the muscle segments (myotomes) together. Sometimes gaping can result in the complete disintegration of the flesh. Gaping is of economical importance because it reduces the value of the fish fillets. The extent of gaping in fish fillets may be influenced by the condition of the whole fish prior to preparation and freezing of the fillets, length of storage of the whole fish in ice, and the pH of the muscle of the fish. The present study was carried out to determine whether a particular size-range of cod fish was more prone to gaping than any other size range.

Fresh cod (Gadus morhua L.) were obtained periodically from a single commercial trawler operating within a 40-mile radius of Aberdeen, Scotland. The fish were dressed and the prepared fish were then frozen individually in an air-blast freezer at -30° C. The frozen fish were stored for about 1 month at -30° C. The fish were partly thawed at room temperature for 1 to 4 hr., then more completely thawed at 2° C. for 1 to 3 days, depending upon the size of the fish. Measurements were made for size of whole fish, pH of the muscle, and the extent of gaping of the thawed fillets.

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THE CONNECTIVE TISSUES OF FISH. VI. MECHANICAL STUDIES ON ISOLATED MYOCOMMATA

Love, R. M., J. Lavéty (Torry Research Station, 135 Abbey Road, Aberdeen, Scotland), and N. G. Garcia
Journal of Food Technology 7, No. 3, 291-301 (Sept. 1972)

The previous reports in this series dealt with the various factors that cause failure in the connective tissue which holds the myotomes of a fillet together. (The myotomes are the muscle segments of the fish. The connective tissue sheet is the myocomma.) Earlier work by R. M. Love, J. Lavéty, and P. J. Steel, [J. Fd Technol. 4, 39 (1969)] showed that tubular processes project from each myocomma and extend between the adjacent muscle cells. When these processes break at the muscle cell-myocomma junction, the phenomenon known as gaping occurs. In the present study, the breaking strengths of myocomma tissue under different conditions were determined.

The myocommata were carefully removed from the fish fillets. A 1-cm. strip was cut from each myocommata, and the ends of each strip were tied with linen surgical suture thread. One end was fastened to a hook in the base of a buffer solution chamber and the other end was attached to a movable beam. The buffer chamber was mounted in a bath of ice water. The beam pivoted at its center. One end of the beam was attached to the myocommata specimen and the other end was attached to a transducer which measured the tension. This equipment was used to measure the breaking-strengths of the strips of myocommata at different pH values and at different temperatures. When the effect of temperature was examined the

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BIOSYNTHESIS OF TRIACYLGLYCEROLS IN DOGFISH (SQUALUS ACANTHIAS) LIVER: INCORPORATION OF ($1\text{-}^{14}C$) PALMITIC ACID INTO ACYL CHAINS

Malins, Donald C., and Paul A. Robisch (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, 2725 Montlake Blvd. East, Seattle, WA 98102)
Comparative Biochemistry and Physiology 43, No. 1B, 125-127 (Sept. 15, 1972)

Earlier work showed that the triacylglycerols of dogfish are actively metabolized in a cell-free preparation from the liver and that acyl chains of position 2 are more rapidly metabolized than those on positions 1,3 [D. C. Malins and J. R. Sargent, Biochemistry 10, 1107-1110 (1971)]. These findings relate to the validity of pathways that have been suggested for the biosynthesis of triacylglycerols in marine fish. In the present study, palmitic acid was administered to dogfish via intrahepatic injection and the uptake of radioactivity into acyl chains on positions 2 and 1,3 of the hepatic triacylglycerols was determined. The metabolic data were evaluated in terms of the fatty acid composition of the acyl chains.

There was a distinct preference for the incorporation of radioactivity into acyl chains of position 2 of triacylglycerols, indicating that these chains are actively metabolized. It appears that the biosynthesis of the hepatic triacylglycerols occurs primarily via the Kennedy-Weiss pathway rather than via acylation of 2-acylglycerols.

[2 tables, 10 references]

FTP

2.00

Small cod gape more than do large cod, particularly in the summer and autumn. However, in the winter and spring this size relationship may disappear or even be reversed. This reversal is probably caused by variations in the pH values of the two size groups (gaping increases as the pH falls), which can sometimes override the size effect.
[5 figures, 1 table, 9 references] FTP

2.02 LIPID TRANSPORT IN THE DUNGENESS CRAB, CANCER MAGISTER DANA
(0.36)

Allen, W. V. (Dept. of Biology, Humboldt State College, Arcata, CA 955201)
Comparative Biochemistry and Physiology 43, No. 1B, 193-207 (Sept. 15, 1972)

This article discusses preliminary information on the mechanisms of lipid transport in the Dungeness crab. Such knowledge of the means by which lipids are mobilized in the hemolymph is of use concerning crustacean metabolism and endocrinology. In this study the levels of hemolymph lipids of the Dungeness crab were determined.

The total concentration of the hemolymph lipids ranged from 14.9 to 94.0 mg%; females with developing ovaries showed the highest levels. The phosphatides, phosphatidyl ethanolamine, and phosphatidyl choline constituted from 65 to 85% of the total hemolymph lipids. Also, data are given on the concentrations of lipid classes in the hemolymph of the female and of the male crab, and on the fatty acid composition of hemolymph lipid classes.
[5 figures, 5 tables, 29 references] FTP

2.113 ORGANOLEAD COMPOUNDS IN ANTIFOULING PAINTS

Dick, Richard J. (Battelle Mem. Inst., Columbus, Ohio)
Chemical Abstracts 77, No. 10, 63431b (Sept. 4, 1972)

2.9 WHOLESOMENESS OF FISHERY PRODUCTS. II. DIMETHYLNITROSAMINE (6.54)(3.5) IN SALTED CODFISH EGGS

Nakamura, Masayoshi, Mutsuo Usuji, and Toru Fukumi (Japan)
Chemical Abstracts 77, No. 5, 32914g (July 31, 1972)

1.0112 (1.34)

million. The catches in the southern and northern areas are expected to be 7.7 and 8.9 million, respectively. Escapement goals for 1972 are approximately 6 million pinks for southern southeastern and 4 million for northern southeastern Alaska. These goals are based in part on the 1972 returns being similar in magnitude and distribution to the 1972 forecast.
[6 figures, 6 tables, 6 references] SW

2.112 HOW TO PLAN AND CUT NETS
(2.1121)

Hillier, Albert J. (Dept. of Fisheries and Marine Technology, University of Rhode Island, Narragansett, RI 02882)
University of Rhode Island Marine Bulletin Series, No. 8, 12 pp. (Sept. 1972)
Available from the Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882.

This article shows how to plan (or scale) and cut the sections called bellies, squares, wings, and jibs of midwater and bottom nets.
[19 figures] FTP

2.00

apparatus bath was at the same temperature as the incubation bath for the myocommata strips. Cod, haddock, and catfish (Anarhichas lupus L.) were used in the tests. Phosphate buffers were used to provide the appropriate pH values between 6.2 and 7.2.

The mechanical strength of isolated myocommata of fish is altered by pH of the surrounding fluid; the effect is reversible. (The gaping of cod fillets--prepared from cod frozen in rigor mortis, thawed, and filleted--is then probably due in part to the lower pH of the muscle and not necessarily to a strong rigor contraction.) Myocommata become weakened when incubated at 15° C. or higher for 1 hr., but they regain their strength if they are subsequently cooled to 0° C., provided the original incubation temperature had not exceeded 30° C.

The myocommata of haddock are intrinsically stronger than those of cod. The gaping of haddock probably stems from their lower ultimate pH. The myocommata of the catfish are also stronger than those of cod, but catfish fillets do not exhibit gaping.

The authors found that chilled cod frozen in rigor mortis will be virtually free from gaping after thawing if either of the following conditions exist: water content of the muscle is 81% or more, if the ultimate pH is 6.9 or higher, or if the lactate content is 180 mg% or less.
[4 figures, 1 table, 19 references] FTP

2.05
(0.5)

ACTIVATION OF A TOXIC COMPONENT OF CLOSTRIDIUM BOTULINUM TYPES C AND D BY TRYPSIN

Eklund, M. W., and F. T. Poysky (Pacific Fishery Products Technology Center, National Marine Fisheries Service, NOAA, Seattle, WA 98102)
Applied Microbiology 24, No. 1, 108-113 (July 1972)

Reports of other studies indicated that toxigenicity of C. botulinum type C (strains 468C and Stockholm) and type D (strains 1873 and South African) required active and continued participation of specific bacteriophages. Loss of these bacteriophages results in a loss of the dominant toxin. In addition, it was found that isolates of strains Stockholm, 468C, and 1873, free of the bacteriophages, continue to produce low levels of a second toxin that is antigenically monospecific. The toxic properties of this toxin are manifest only after treatment with trypsin.

The trypsin activated toxic component was designated C_2. By using trypsin treatment this study demonstrated that some types C and D cultures previously thought to be nontoxic produce C_2 toxin.

Strains of types C and D were grown in medium containing 3% trypticase, 2% yeast extract, 0.2% glucose, and 0.1% cysteine hydrochloride (TYG medium), and in SFEM (Segner's Fortified Egg-Meat) medium containing 0.3% glucose and 0.5% ammonium sulfate (Applied Microbiology 22, 1017-1024 (Dec. 1971)). The cultures were incubated at 33° C. for 5 days.

Of 21 strains that produce C_1 toxin only one did not produce C_2 toxin. The C_2 toxin was detected in 14 of the culture supernatants only after trypsin treatment, and the toxin was detected in the untrypsinized supernatants of six cultures. Toxicity of these supernatants was increased by trypsin treatment. Of 19 strains

(over)

2.119
(2.116)

CHARTWORK FOR FISHERMEN AND BOAT OPERATORS

Motte, G. A. (Dept. of Fisheries and Marine Technology, University of Rhode Island)
University of Rhode Island Marine Bulletin, No. 7, 86 pp. (1972). Price $3.00. Available from the Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882.

Chartwork is used to plot a ship's progress in sight of land; navigation is a similar process for ships out of sight of land. In chartwork, basic geometric concepts are applied to a ship's course, speed, bearings, and position lines. Navigation makes use of trigonometry to observations of celestial bodies and also uses position lines from electronic aids to determine a ship's position. This text covers basic definitions for position, fixing position near land, reading a chart, general chart layout, distance, the running fix, earth's magnetism, ship's magnetism, the compass, chart projections, practical chartwork, allowing for wind and tide, tides, the marine sextant, vertical sextant angles, horizontal sextant angles, rising and dipping of lights, lines of soundings, the three-bearing problem, the sailings, the traverse tables, plane sailing, and mercator sailing. There is an exercise at the end of each section FTP

2.119

AN ANALYSIS OF FATAL SKIN AND SCUBA DIVING ACCIDENTS

Schenck, Hilbert, Jr. (Dept. of Ocean and Mechanical Engineering, University of Rhode Island, Kingston, RI 02881), and John McAniff (Dept. of Ocean Engineering, University of Rhode Island)
Marine Technology Society Journal 6, No. 3, 41-48 (May-June 1972)

An analysis was made of 503 diving fatalities that occurred from the year 1946 to 1970. From 70 to 80% of this total sample resulted from scuba diving and half of the victims were in the 16 to 25 year age group. Between 8 and 13% of the persons involved were on their first scuba dive. Most of the cave diving fatalities involved failure on the part of the divers to use proper equipment; also, this accident group usually involved deeper dives. Although most autopsy reports gave "drowning" as the cause of death, there was some indication that about 25% of the fatalities may have involved lung over-pressures. The authors suggest six areas where it would be possible to help reduce the number of fatal accidents. These are (1) by stopping the sale of scuba to untrained persons, (2) by the control of cave diving operations, (3) by engineering and improved training studies of buddy breathing and buddy rescue, (4) by obtaining more complete accident investigation data, (5) by a redesign of life vests, and (6) by a simplification of the present weight, tank, and vest mounting systems.
[7 tables, 5 references] FTP

2.4
(1.51)(2.00)

DANISH COD ROE EXPERIMENTS IN 1971

Anonymous
Årsberetning fra Fiskeriministeriets Forsøgslaboratorium for 1971 (Annual Report to the Danish Fishing Industry), pp. 32-37 (1972). Copenhagen, Denmark.

The changes occurring in cod roe were studied from the moment that it is removed from the freshly caught cod up to the time when it is considered unfit for human food.

The untreated cod roe is rich in nutritional factors. It consists of 20 to 24% protein and 1.5 to 2.5% fat; in addition, it contains large amounts of vitamins A, B, and D and iron, calcium, and phosphorus. In 1971, 1,670 tons of cod roe were landed in Danish ports.

In experiments with iced cod roe there were no marked changes during the first 5 days of storage of fresh roe. After a total of 7 days from catch an increasingly putrid odor was evident accompanied by a change to a bluish color. In cooked roe, after about 1 week of iced storage, the characteristic flavor changed to neutral, and the texture became rather dry. After 9 to 12 days, the cooked roe had a decayed, sour, and somewhat putrid flavor. The content of volatile bases and acids, the amount of hydrogen sulfide, and the redox potential are indicators of the quality changes in the roe. All the indicators except redox potential gave low results from tests of the iced roe for a week after catch. They rose sharply during the next few days. These changes are similar to those in iced gutted fish. The sharp increase in hydrogen sulfide is characteristic of cod roe (about 4 to 6 mg./kg. after 12 days). The high redox potential was of

(over)

2.119 RESEARCH DIVER'S MANUAL

Somers, Lee H. (Dept. of Meteorology and Oceanography, College of Engineering, University of Michigan)
Sea Grant Technical Report No. 16, MICHU-SG-71-212, xvii + 366 pp. (Aug. 1972) (University of Michigan Sea Grant Program, Ann Arbor, MI 48105) Price not indicated.

This technical report contains a discussion of the basic principles of air diving with SCUBA (self-contained underwater breathing apparatus) and surface-supplied equipment. The primary emphasis is on diving in the Great Lakes. Future chapters will cover ocean diving, biological and research techniques, underwater photography, light salvage, underwater research procedures, mixed gases, and other specialized diving techniques. The chapters covered in the present manual are Introduction, Diving Physics, Physiology and Medical Aspects of Diving, Diving Procedures, Diving Without Breathing Apparatus, Self-Contained Diving, Surface-Supplied Diving, and Diving Environment.
[86 figures, 8 tables, 178 references, 6 appendixes] FTP

2.3 SHELLFISH PROCESSING MACHINE

Jones, John M., Jr. (Hertford, NC 27944); assignor to Mrs. Elvira Cheatham Jones, Henderson, NC 27536 (pat.)
U.S. Patent 3,698,038 (Oct. 17, 1972)

This apparatus is for automatically removing the heads, veins, and shells of shrimp, and for size-grading the shrimp in sequential steps. FTP

2.4 (1.51)(2.00)

the order of +100 mv. during the first 5 to 7 days, then declined rapidly to about -100 mv. The decrease coincided with the increasing formation of hydrogen sulfide.

Organoleptic tests of iced roe vacuum packed in plastic bags, or stored directly on ice without protective covering, showed no differences; and storage life was judged to be the same for both, about 10 to 12 days. The content of volatile bases and hydrogen sulfide was higher in the packed roe. Roe in bags of either oxygen permeable or impermeable plastic gave similar results.

Initial counts of bacteria on cod roe were found to be 100,000/g.; experiments were performed to determine the effects of reduced initial counts on storage stability. Bacterial counts were reduced either by irradiation of normally removed roe after landing (0.1 Krad) and packing in individual polyethylene pouches or by aseptic removal of roe from the fish and packing in plastic bags without any contact with wooden surfaces. Irradiation reduced the initial count to just under 10,000/g. Subsequent growth of bacteria was highest in the irradiated roe; after 10 days storage, nonirradiated and irradiated roe showed the same count. However, irradiated roe was acceptable for human consumption 17 days after catch, while nonirradiated roe was spoiled 9 to 11 days after catch. In the aseptic removal technique, initial counts were 100 to 1,000/g. of roe. The storage life was about 17 days. Roe with initial counts of 100,000/g. and stored similarly had a storage life of 10 to 12 days.

The authors concluded that new methods should be found to reduce initial counts of bacteria in roe and that the use of clean plastic boxes, not dirty wooden boxes, would aid in attaining this goal.
[3 figures] SW

2.05 (0.5)

that do not produce C_1 toxin (thought to be nontoxic) 9 cultures produced C_2 toxin which required trypsinization to show toxicity, and 3 cultures produced C_2 toxin which did not require trypsin treatment for demonstrable toxicity. However, toxicity was increased by trypsinization. Only strain AOA113, of type D strains tested, produced C_2 toxin, and trypsin treatment was required.

Supernatant fluids of culture AO28 (does not produce C_1 toxin) were tested to determine effects of pH and incubation time at 37° C. on toxicity of C_2 toxin incubated with 0.25% trypsin. The pH and time required for maximum toxicity was 6.5 for 60 min.

The authors point out that type C and D cultures produce trypsin-activable toxin C_2; antiserum prepared for use against type C and D toxins should include the C_2 component.
[5 tables, 23 references] SW

0.5 GERMINATION REQUIREMENTS OF SPORES OF CLOSTRIDIUM BOTULINUM TYPE E

Ando, Yoshiaki (Hokkaido Inst., Public Health, Sapporo, Japan)
Chemical Abstracts 76, No. 25, 150911F (June 19, 1972)

2.43 PACKAGING OF FROZEN PRODUCTS

Chevassus, F.
Rev. ATIP 26, No. 1, 1-13,15-29 (1972) (In French)
BFMIRA Abstracts 25, No. 10, Abstract No. 3791, 757 (Oct. 1972)

"A summary is given of the techniques of freezing and deep freezing, and the French market for deep frozen products is compared with that of other countries. A comparison is also made of different packaging systems and of packaging costs. Hot melt coatings and their characteristics, packaging machines and various types of closures are discussed. A great deal of information is presented in table format in this first part. In the second part, market constituents are discussed; packaging of vegetables, fruits, meats, seafoods. Production and packaging problems of the deep freeze product manufacturers are considered, and in the conclusion is a review of perspectives and trends with regard to the food and base production industries. In the final discussion, the 'food' board and its market, future, specifications, regulations are reviewed. The necessity to redefine the characteristics of the board as a function of its use, the concept of high speed deformation of a board and its importance, sticking the film to the paper, imperviousness of the paper to odours are all questions which received consideration. The type of paper and board expected to be produced in five years hence are discussed and lastly, the choice between using hot melts or polyethylene films is investigated." Reprinted

2.8 RECONSTITUTING PREPLATED FROZEN MEALS WITH INTEGRAL HEAT

Fries, J. A., and D. M. Graham (Dept. of Food Science and Nutrition, College of Agriculture, University of Missouri, 1-74 Agriculture Bldg., Columbia, MO 65201)
Food Technology 26, No. 11, 76-77, 80, 82 (Nov. 1972)

Integral heat, as defined here, is electrical resistance heat produced close to the plated food item. A special two-part casserole dish is used; it has a ceramic interior surrounded by a polymer shell. The polymer shell insulates the outside of the dish so that the dish remains cool while the food is cooking on the inner porcelain surface. A resistor is fused onto the surface of the inner porcelain dish, and metal contact points on the exterior of the dish conduct electricity from a power supply to the resistor. The covered dishes (containing the food) are fitted into a unit which supplies the power and serves as an oven (the atmosphere in the oven is not heated). Most of the heat generated in the plate is transferred directly to the food by conduction; cooking time and environmental temperature are reduced. A 9 to 12 oz. frozen meal can be reconstituted in 18-22 min. of heating time. [A description of integral heating was published in Food Technology 26, No. 9, 27-28 (Sept. 1972).]

This article reports the results of comparative tests (organoleptic, nutritive retention, and weight and moisture loss) of foods cooked with integral heat and with conventional (convection) heat. The meals consisted of the following items: a seared 5-oz. beef tenderloin fillet, 2 oz. of frozen blanched peas, and 2 oz. of canned new potatoes browned in a butter, salt, and paprika mixture. The

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3.12 FISH PRESERVATION

Hastensen, H., and H. Hov (pat.)
Canadian Patent 906,308
Food Technology 26, No. 11, 127 (Nov. 1972)

Fish are preserved aboard vessel or ashore by placing them in containers of a preserving agent (such as brine containing an enzyme absorbing agent). FTP

3.12 SHELLFISH PRESERVATION

Walker, E. L. (pat.)
Japanese Patent 1754572
Food Technology 26, No. 10, 101 (Oct. 1972)

The shellfish meat is immersed in salt solutions containing antibiotics, then heated to 180°-210° F. FTP

3.12 (4.60) THE USES OF SULPHUR DIOXIDE IN THE FOOD INDUSTRY. A REVIEW

Roberts, A. C., and D. J. McWeeny (Ministry of Agriculture, Fisheries and Food, Food Science Division, Food Research Institute, Colney Lane, Norwich NOR 70F, England)
Journal of Food Technology 7, No. 3, 221-238 (Sept. 1972)

The uses of sulfur dioxide as a food additive are classified below together with some representative examples of these uses.

1. For the inhibition of nonenzymic browning.--Nonenzymic browning is the result of reactions between amino groups and active carbonyl groups leading to the formation of insoluble dark colored polymers. These reactions in foods cause a darkening of color, production of different flavors, and sometimes the production of insoluble material. Examples of such use of sulfur dioxide involve canned heat-processed foodstuffs (comminuted meats--sausages); dehydrated products (pork, chicken, milk, vegetables); frozen products (fruits, vegetables); stored products (wines); and sugar.

2. For inhibition of enzyme-catalyzed browning reactions.--Enzymic browning results from the production of pigment as the result of enzymatically oxidized phenolic compounds of natural origin. Examples of such use of sulfur dioxide involve dehydrated products and those having low water activity (freeze dried vegetables, fruits in sugar solution), and hydrated products having high water activity (pickled onions, pickled horseradish, prepeeled potatoes).

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3.17 (3.12) PRESERVATION OF HAKE IN TREATED ICE

Wessels, J. P. H., Engela Lamprecht, J. de A. Rodrigues, and C. K. Simmonds (Fishing Industry Research Institute, University of Cape Town, Private Bag, Rondebosch, Cape Province, South Africa)
Journal of Food Technology 7, No. 3, 303-307 (Sept. 1972)

The South African fishing industry needed to obtain a relatively small increase in the storage life of its whitefish. Therefore, the present experiments were carried out to determine the effectiveness of various antimicrobial agents included in ice for lengthening the storage life of hake. The chemicals used were sodium EPHB [the letters were not defined], ethylenediaminetetraacetate (EDTA) plus TPP [presumably tripolyphosphate], propylene glycol, potassium sorbate, sodium propionate, sodium benzoate, and a commercial product of unknown composition. Sodium benzoate and potassium sorbate were also tested in combination. The dressed hake were packed in the antiseptic ices. The ices were prepared in a flake ice machine using tap water and the test chemicals. Organoleptic tests and bacterial counts were made of the samples to assess their condition during storage.

All the ices containing the additives prolonged the storage life of dressed hake. Generally, 0.5% sodium benzoate showed the best preservative action, with 0.3% sodium benzoate slightly poorer. The combination of potassium sorbate and sodium benzoate generally failed to give better results than did the sodium benzoate by itself. Ice containing sodium benzoate melted more slowly than did ice containing no additives.

[1 table, 13 references] FTP

3.12 (4.60)

3. For use as an antioxidant and as a reducing agent.--As an antioxidant, sulfur dioxide is used in fruit juices and comminuted meats; it also serves as a reducing agent in meats.

4. For inhibition and control of microorganisms.--Sulfur dioxide is used to help delay growth of molds, yeast, or bacteria on fruits and in sausages.

The most specific use of sulfur dioxide is for its ability to inhibit nonenzymic browning in a variety of foods and in a variety of processes; in this mode of action, the authors believe that there is no substitute. Alternatives to the use of sulfur dioxide include lowering of pH, dehydration to low water content, separation of active species, and addition of sulfhydryl compounds; however, these alternatives are limited in action or have been applied only to laboratory scale or pilot scale work.

Heat-inactivation of enzymes in foods [blanching] may be an alternative to use of sulfur dioxide. As an antioxidant or reducing agent in foods, it might be replaced by a variety of permitted chemicals--ascorbic acid, the tocopherols, cysteine, and glutathione. As an inhibitor of microorganisms in food, sulfur dioxide might be easily replaced by various more effective inhibitors such as lactic acid, propionic acid, benzoic acid, and p-hydroxybenzoic acid. If use of sulfur dioxide in foods is limited to those applications concerned with controlling nonenzymic browning, the dietary intake of sulfur dioxide could be substantially reduced. [2 tables, 119 references] FTP

3.12 (3.5) NUTRITIVE ANTIOXIDANTS AND THEIR INHIBITING ACTION ON THE OIL OF PICKLED ATLANTIC HERRING

Pechatina, V. I. (U.S.S.R.)
Chemical Abstracts 77, No. 7, 46882g (Aug. 14, 1972)

3.12 REACTION BETWEEN FORMALDEHYDE AND FISH PROTEINS

Lipparini, Luigi (Ist. Merceol., Univ. Bologna, Bologna, Italy)
Chemical Abstracts 77, No. 7, 46887n (Aug. 14, 1972)

3.12 FOOD ADDITIVES FOR FISHERY PRODUCTS.
I. EFFECTS OF VITAMIN B1 LAURYL SULFATE ON MOLD GROWTH

Sakamoto, Masakatsu, and Teruhiko Sato (Japan)
Chemical Abstracts 77, No. 5, 32919n (July 31, 1972)

2.8

meals were stored at -20° F. until just prior to cooking. Integrally heated meals were reconstituted in the dishes for 21 min. Convection heated meals were reconstituted in an airlines-type convection heater at 350° F. for 40 min. The cooking times were selected on the basis of the length of time required to heat all the components in all the meals to at least 140° F.

The organoleptic ratings and the nutritive retention was generally better for the food reconstituted by integral heating than for the food reconstituted by convection heating. Furthermore, the weight and moisture loss for the integral heated foods was less. The authors conclude that integral heat has unlimited possibilities for the food industry, the government, and the consumer.
[3 figures, 9 tables, 3 references] FTP

3.12 FISH PRESERVATION

Ueno Seiyaku KK (pat.)
Japanese Patent 22263/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Alkali metal salts of saturated carboxylic acids are used to preserve fish paste foods. FTP

2.43 THE QUANTITATIVE DETERMINATION OF ADDITIVES FOR PLASTICS IN FOOD MODEL SYSTEMS. I. DIRECT DETERMINATION IN FAT MODEL SYSTEM HB 307 BY u-v SPECTROSCOPY

Koch, J.
Dt. Lebensmittelrdsch. 68, No. 7, 216-221 (1972) (In German; English summary)
BFMIRA Abstracts 25, No. 10, Abstract No. 3808, 761 (Oct. 1972)

Methods for the determination of antioxidants, heat stabilizers, u-v stabilizers and plasticizers for plastics are given. C.S.B. Reprinted

3.12 FISH PRESERVATION

Ueno Seiyaku KK (pat.)
Japanese Patent 22264/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Alkali metal salts of maleic acid are used to preserve fish paste foods. FTP

3.230 RECOMMENDATIONS FOR THE PROCESSING AND HANDLING OF FROZEN FOODS

Bramsnaes, F. (chairman)
Prepared by the International Institute of Refrigeration Working Party on Frozen Foods.
Annexe au Bulletin de l'Institut International du Froid (International Institute of Refrigeration), 177 Boulevard Malesherbes, Paris, France (2d edition, 1972), 236 pp. (In English and French). Paper bound $9 or F45 (Special rates for quantity orders; 10 to 25 copies, $8 or F40 each; 26 to 49 copies, $7 or F35; over 50 copies, $6 or F 30.)

The first edition of this bulletin was published about 10 years ago. This new second edition includes new knowledge acquired during the interim period. A team of 19 experts of the International Institute of Refrigeration prepared this new edition.

The first section provides a definition of terms (frozen foods, equilibrium temperature, freezing rate, etc.). The next section deals with the general principles for the freezing, storing, and thawing of foodstuffs: (1) Scientific background, including the physical, physico-chemical, and biochemical aspects of freezing; microbiology; and temperature measurement. (2) Applications, including hygiene in the preparation of frozen products, packaging, freezing, storage, time-temperature tolerance, transport, display and retail sale, thawing, nutritional aspects, and consumer applications. The final (new) section is devoted to the freezing of vegetables, fruits, meats, seafoods, poultry, eggs and egg products, milk products, prepared foods, bakery and confectionery products, and edible ices,

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3.30 CANNED FISH PRODUCT

Sanko Shokuhin KK (Pat.)
Japanese Patent 22261/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Flaked boiled fish are coated with a starch gum containing antioxidant, then packed in cans. The sealed cans are then sterilized. FTP

3.330 EFFECT OF THE TYPE OF FISH AND THE DEGREE OF ITS FRESHNESS ON THE COLOR OF THE TOMATO SAUCE IN CANNED GOODS

Safronova, T. M. (U.S.S.R.)
Chemical Abstracts 77, No. 9, 60215y (Aug. 28, 1972)

3.2344 FISH BLOCK PRODUCT

Hokkaido KK (pat.)
Japanese Patent 17825/72
Food Technology 26, No. 11, 127 (Nov. 1972)

Skinless fillets are first immersed in polyphosphate solution, then mixed with a binder consisting of comminuted white fish, sodium chloride, and polyphosphate. The mixture compressed into a block, is then frozen.

FTP

3.2344 FREEZING PROCESS

Nippon Seisan Kaisha Ltd. (pat.)
Japanese Patent 22262/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Plastic film layer is placed between food block and freezing surface to facilitate separation of the block. FTP

3.3349 (ACCIDENTS) SLIPS AND FALLS. PART 1. ASSESSING THE INITIAL PROBLEMS. PART 2. SAFETY ASPECTS OF FLOOR CARE

Anonymous
FMF Rev., pp. 10-12 (April 1972); pp. 8, 10, 12 (May 1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3737, 748 (Oct. 1972)

In the first part typical accidents occurring in factories and their causes are outlined with a brief mention of legal requirements intended to minimize hazards to workers. Part 2 concerns itself, as the title suggests, with the particular aspect of floor safety and measures which must be taken to ensure minimum danger from this source. A useful table of the physical properties of 14 types of flooring is given. D.M.L. Reprinted

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3.3349 ENCOURAGING A POLICY OF SAFETY INVESTMENT

Pettie, J. T.
FMF Rev. pp. 24-25 (July 1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3813, 762 (Oct. 1972)

Special problems of safety and health of employees in the food industry are discussed and the work of FMF in helping to reduce these problems is outlined. Reprinted D.W.F.

3.231 (3.234) FROZEN FOODS, A WHOLE RANGE OF FROZEN PRODUCTS

Dutrieux, L.
Rev. Conserve Aliment. mod., Nos. 7/8, 72-78 (1972) (In French)
BFMIRA Abstracts 25, No. 12, Abstract No. 4372, 523 (Dec. 1972)

A French firm which specialises in frozen seafood products, is described including details of processes and equipment. R.A. Reprinted

3.330 NEW INFORMATION ON THE MANUFACTURE OF CANNED FOODS

Reichert, J. E.
Fleischerei 23, No. 3, 11-12 (1972) (In German)
BFMIRA Abstracts 25, No. 5, Abstract No. 1792, 364 (May 1972)

In this short dissertation on the manufacture of canned meat and meat products, the influence of the F value on the keeping quality, the evaluation of the heating process by means of F, E and C values and the connection between the heating temperature and the thermal conductivity of the product are considered. The sterilization temperatures necessary for various meat products are mentioned with respect to the latter. C.S.B. Reprinted

3.239 REVERSIBILITY OF THE FREEZING PROCESS

Chernyshev, V. M., L. D. Serazhutdinova, and L. A. Shkermontova (U.S.S.R.)
Chemical Abstracts 77, No. 7, 46872d (Aug. 14, 1972)

3.7 FISH-SOYBEAN FOODSTUFF

Ichihata, H.; Morinaga Confectionery Co. (pat.)
U.S. Patent 3,663,234
Food Technology 26, No. 8, 95 (Aug. 1972)

A mixture of refined fish meat and soy curd or bean soup is molded. The prepared mixture is then steam heated, followed by refrigeration and drying. FTP

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and includes a chapter on the practical storage life of frozen products. It is suitably indexed and contains a bibliography of 26 references.

This book should be useful to frozen food processors, distributors, and retailers, and to administrative or regulatory personnel concerned with controlling or regulating the industry. FTP

3.331 APPARATUS FOR CANNING FISH

Mencacci, Samuel A. (Saratoga, CA 95070); assignor to International Machinery Corporation S.A., St. Nicklass-Waas, Belgium (pat.)
U.S. Patent 3,700,386 (Oct. 24, 1972)

This apparatus is used for filling cylindrical containers with chunk tuna or the like; it minimizes the tendency of the fish to adhere to the surfaces of the filling apparatus. FTP

3.2 THE IMPROVEMENT OF THE COOLING LINE IN STORAGE

Junge, B.
Lebensmittel-Ind. 19, No. 8, 329-333 (1972) (In German, English summary)
BFMIRA Abstracts 25, No. 12, Abstract No. 4414, 534 (Dec. 1972)

The author is mainly concerned with freezing and frozen storage of meat but butter and fish are also considered. R.A. Reprinted

3.331 (9.19) EFFECT OF PROCESSING ON THE MERCURY CONTENT OF CANNED TUNA

Piratti, Duilio, Pietro Pirazzoli, Stefano Gherardi, and Gabriele Guidi (Italy)
Chemical Abstracts 77, No. 5, 32840e (July 31, 1972)

4.19 (0.31)

PRESENCE OF TRANS-6-HEXADECENOIC ACID IN THE WHITE JELLYFISH AURELIA AURITA LAMARCK AND IN A CARIBBEAN GORGONIAN

Hooper, S. N., and R. G. Ackman (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Lipids 7, No. 9, 624-626 (Sept. 1972)

Reports from other work indicated that trans-6-hexadecenoic acid (THD) had been isolated from the depot fat of the leatherback and two other marine turtles. In addition, the fatty acid had also been found in the ocean sunfish and the sea anemone (Metridium dianthus).

Analysis of lipid from the white jellyfish and the gorgonian indicated that 2% and 0.9% consisted of THD, respectively. The methods of analysis used were thin-layer and gas-liquid chromatography. No indication of a specific metabolic or functional value for THD has been found after a study was made of the distribution of the fatty acid in the tissues and organs of the leatherback turtle. Invertebrates easily accumulate free fatty acids from sea water. The authors suggest that the origin of THD in jellyfish and gorgonian could be from the dissolved fatty acids in the sea water. Since jellyfish are part of the diet of leatherback turtles and sunfish, the authors suggest that THD found in the lipid of these animals could have originated with the lower forms.

[1 table, 12 references] SW

4.9 (9.14)

EFFECT OF DIETARY LINOLENIC ACID AND DOCOSAHEXAENOIC ACID ON GROWTH AND FATTY ACID COMPOSITION OF RAINBOW TROUT (SALMO GAIRDNERI)

Yu, T. C., and R. O. Sinnhuber (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Lipids 7, No. 7, 450-454 (1972)

Linolenic and related fatty acids (ω3) have been found to be essential for rainbow trout. Only linolenic acid has been used to study the ω3 fatty acid requirements of fish thus far. Experiments were performed to isolate the long chain unsaturated docosahexaenoic acid (22:6ω3) from fish oil and to compare the effect of this fatty acid with that of linolenic acid on growth and fatty acid composition of rainbow trout.

Oil extracted with chloroform-methanol from freeze-dried roe of Pacific coho salmon was the source of laboratory prepared docosahexaenoic acid. The methyl linolenate (18:3ω3) used was a commercial preparation.

Semipurified diets incorporating methyl linolenate and docosahexaenoic acid at several levels were fed to rainbow trout previously maintained on a fat-free diet. After 14 weeks, the weight gain, the extent of feed conversion of the fish on each diet, and the fatty acid composition of the lipid from each group of fish were determined.

The control group of fish, which did not receive either methyl linolenate or docosahexaenoic exhibited a shock syndrome, poor appetite, and very slow growth rate. Tissue fatty acid analysis by gas-liquid chromatography (GLC) of this group

(over)

4.9

ODD NUMBERED AND NEW ESSENTIAL FATTY ACIDS

Schlenk, H. (University of Minnesota, The Hormel Institute, Austin, MN 55912)
Federation Proceedings 31, No. 5, 1430-1435 (Sept.-Oct. 1972)

Odd numbered straight-chain fatty acids occur widely in natural lipids, but the percentages of these fatty acids in total fatty acids are small and only a minor amount is polyunsaturated. In higher animals the fatty acids contain between 1 and 5% odd numbered chains. Up to 50% of lipids in microorganisms are composed of odd numbered fatty acids. These fatty acids generally are found more in marine than in terrestrial animals.

The author speculated on the biosynthesis of odd numbered fatty acids. Of the modes of synthesis mentioned one was through a precursor different from acetic acid which leads to synthesis of odd long chains and subsequent desaturation and elongation by two carbon units resulting in polyunsaturated odd acids. In reports of other work, propionic acid has been suggested as the starter for synthesis of odd numbered fatty acids. Anaerobic chain synthesis with acetate as the starter has also been suggested as a pathway to synthesis of odd numbered fatty acids.

Vertebrates lack the ability to synthesize the even numbered linoleic and linolenic acids, but they are able to elongate and desaturate these acids supplied in the diet. The same principles are applicable to odd numbered acids. The similarities of odd and even fatty acids in structure and in metabolism have instigated experiments in other laboratories to test polyunsaturated odd numbered acids for essentiality. Reports from these sources indicated odd numbered ω5 acids could be substituted for even numbered ω6 acids in functions of essentiality.

 (over)

5.112 (0.35)

VITAMIN A AND PROTEIN METABOLISM

Roels, Oswald A. (Lamont-Doherty Geological Observatory of Columbia University, Palisades, NY 10964), and James P. Mack (Dept. of Biology, City College, City University of New York, New York, NY 10031)
Journal of Agricultural and Food Chemistry 20, No. 6, 1133-1135 (Nov.-Dec. 1972)

This paper reviews work concerning the relationship between vitamin A and protein in humans and animals. Outside its function in the visual process, the exact function of vitamin A is not known. It is necessary for growth; therefore, it is linked to protein metabolism.

Studies related to humans indicate that vitamin A deficiency and protein malnutrition often occur together; absorption of dietary vitamin A is impaired in acute protein malnutrition; mobilization of vitamin A from the liver is hampered in protein-calorie malnutrition; dietary protein is required to mobilize liver reserves of vitamin A in the bloodstream; and increased protein intake results in greater requirements for vitamin A.

Animal studies demonstrated that vitamin A influences in vivo synthesis of serum proteins; in vitro synthesis of muscle protein; in vitro synthesis of glycoprotein in the intestinal mucosa due to a factor in the pH 5 fraction; and in vitro synthesis of glycoproteins in the cell membrane.

The mechanisms whereby vitamin A influences protein metabolism are yet unknown; it is not clear whether the effect of vitamin A on protein synthesis is direct or indirect.

[28 references] FTP

4.9

Prostaglandins obtained from ω5 and ω7 odd numbered acids were found to be physiologically highly active.

Concurrent essentiality and formation of active prostaglandins has been reported, with the linoleic acid type and corresponding odd numbered ω5 and ω7 acids, but the author believes that attempts to show essential fatty acid activity of prostaglandins have failed. He believes that more attention should be given to the role of highly unsaturated fatty acids in organisms where they are not essential but synthesized in large amounts. He suggests the functions of these acids might give clues for their function in higher animals.
[1 figure, 6 tables, 76 references] SW

4.9 (0.31) EFFECT OF NORWAY HADDOCK OIL AND COCOA FAT ON THE LIPID AND FATTY ACID CONTENT OF LIVER AND SPLEEN OF RATS

Reimold, W. V., and E. Lang (Physiol.-Chem. Inst., Univ. Mainz, Mainz, Germany)
Chemical Abstracts 77, No. 1, 466w (July 3, 1972)

4.9 (0.36) CHANGES IN RAT HEART MUSCLE LIPID AND FATTY ACID CONTENT UNDER THE INFLUENCE OF NORWAY HADDOCK OIL AND COCOA FAT IN A LONG-TIME FEEDING EXPERIMENT

Lang, K., and W. V. Reimold (Physiol.-Chem. Inst., Univ. Mainz, Mainz, Germany)
Chemical Abstracts 77, No. 1, 467x (July 3, 1972)

4.64 ANTIOXIDANTS

Eisai Co. Ltd. (pat.)
Japanese Patent 22789/72
Food Technology 26, No. 11, 133 (Nov. 1972)

This food antioxidant mixture contains natural vitamin E. FTP

4.64 ANTIOXIDANTS

Fujisawa Pharmaceutical Co. Ltd. (pat.)
Japanese Patent 23026/72
Food Technology 26, No. 11, 133 (Nov. 1972)

These antioxidant mixtures contain butyl hydroxyanisole and dibutyl hydroxytoluene. FTP

4.9 (9.14)

showed eicosatrienoic (20:3ω9) acid accumulated in the phospholipid fraction. The 20:3ω9 level was lowered when either 18:3ω3 or 22:6ω3 was included in the diet.

Both methyl linolenate and docosahexaenoic acid, fed at the 1% level, supported maximum growth of the fish. Results of GLC analyses showed that methyl linolenate was rapidly converted by the fish into docosahexaenoate, with a high concentration in the phospholipid. Dietary docosahexaenoate fed to the fish remained unchanged, and little or no reconversion of this fatty acid was observed.
[1 figure, 5 tables, 18 references] SW

5.122 (5.128) SYNTHETIC VITAMIN A IN ANIMAL APPLICATIONS

Bauernfeind, J. C., and E. DeRitter (Depts. of Biochemical Nutrition and Product Development, Hoffmann-La Roche Inc., Nutley, NJ 07110)
Feedstuffs 44, No. 50, 34-36, 56 (Dec. 4, 1972)

Vitamin A (retinol), in addition to specific activity in vision, is necessary for growth, reproduction, the maintenance of the mucus-secreting cells of the epithelia, the synthesis of glycoproteins (constituents of plasma and saliva), and the prevention of keratinization (development of a hornlike quality in tissue). A short history of vitamin A is presented including manifestations of diet induced vision difficulties and cures recorded in ancient civilizations, its comparatively recent discovery and requirement by man and animals, and later synthetic production in large quantities.

The occurrence of vitamin A is confined to mammals, birds, and fish life; none exists in plants. Before the era of synthetic production, the principal source of vitamin A was the liver and/or body oils of marine fish. Fish ingest carotenoids with food plankton, lower plants, algae, and crustaceans and build up stores of vitamin A from these sources. Plants contain a wide variety and, at times, high concentrations of carotenoids especially of provitamins A. Vitamin A of animal life can be viewed as a degradation product of the carotenoid provitamins A of plant life.

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7.0 (8.42) DETERMINATION OF LEAD IN FISH BY ATOMIC ABSORPTION SPECTROPHOTOMETRY AND BY POLAROGRAPHY. II. COLLABORATIVE STUDY

Gajan, Raymond J., and Damon Larry (Food and Drug Administration, Washington, DC 20204)
Journal of the Association of Official Analytical Chemists 55, No. 4, 733-736 (July 1972)

In part I of this study spectrophotometry and polarography techniques were selected as acceptable in determination of trace lead in fish.

To gain information on reproducibility of results 19 laboratories, using 6 different atomic absorption spectrophotometers and 4 different types of polarographs, participated in a collaborative study. Most collaborators reported no difficulties with the methods.

The average lead recoveries from 6 paired samples at 1 and 2, 5 and 6, and 10 and 11 p.p.m. levels were 97.7% by polarography and 100.7% by atomic absorption. The average standard deviations were 0.32 and 0.41 p.p.m., respectively; the average coefficients of variation were 7.9 and 13.1%, respectively. Since there were no significant differences between the two methods they can be used to confirm each other at the 1, 2, 5, 5, 10, and 11 p.p.m. levels.

The authors recommend that dry ashing of samples followed by atomic absorption or polarography be adopted as official first action for the determination of lead in fish.

[4 tables]

SW

6.85 (8.) CHEMICAL AND PHYSICAL CHARACTERIZATION OF BARNACLE CEMENT

Otness, J. S., and D. G. Medcalf (Dept. of Chemistry, University of Puget Sound, Tacoma, WA 98416)
Comparative Biochemistry and Physiology 43, No. 2B, 443-449 (Oct. 15, 1972)

Barnacles secrete two cements; the first, a mucous material, is involved in the initial attachment of the organism, and the second enables the organism to repair small cracks in its base and to reattach itself in case of detachment. The cement is one of the strongest adhesives known. It is of interest, therefore, relative to its potential use in dental restoratives. Earlier workers [J. R. Saroyan, E. Lindner, C. A. Dooley, and H. R. Bleile, Ind. Eng. Chem. Prod. Res. Develop. 9, 122-133 (1970)] have studied the nature of the adhesive secretions before solidification. The cement is considered to be of proteinaceous material.

In the present study, an attempt was made to determine the chemical composition and physical characteristics of the solidified barnacle cement. Using these data and those of earlier workers, the authors proposed a mechanism for the cementing process.

The acorn barnacle Balanus glandula and the giant barnacle B. nubilus from Puget Sound were used as the source of cement. Samples of unsolidified cement were obtained by placing an acorn barnacle on a ribbed tray in a tank containing circulating sea water. Samples of solidified cement were obtained from the giant barnacle. Qualitative analyses of the unsolidified and solidified cements and of sea water were made for P, S, Cl, K, Ca, Cr, Fe, I, and Sr. Crystallinity of the

(over)

7.42 (8.42) DETERMINATION OF LEAD IN FISH BY ATOMIC ABSORPTION SPECTROPHOTOMETRY AND BY POLAROGRAPHY. I. DEVELOPMENT OF THE METHODS

Gajan, Raymond J., and Damon Larry (Food and Drug Administration, Washington, DC 20204)
Journal of the Association of Official Analytical Chemists 55, No. 4, 727-732 (July 1972)

The present Association of Official Analytical Chemists (AOAC) methods for the determination of lead require ashing the sample, extraction with dithizone or as the sulfide, followed by colormetric analysis of the dithizonate in Nessler tubes or in a spectrophotometer.

A reliable method for the determination of trace amounts of lead in fish was needed. Colorimetric analysis was not sufficiently specific for trace amounts. Based on work of the U.S. Department of Commerce, National Bureau of Standards, (Technical News Bulletin, NBS-STR 4261, (June 1971) the polarographic technique was selected as suitable for trace analysis. Atomic absorption spectrophotometry (AAS) was selected as a check method in the development of the polarographic technique.

Samples of fish weighing about 20 g. each were dry ashed at 500° C. The resulting ash weighed about 1.3% of the sample. The ash was dissolved in 1N HCl and analyzed for lead by AAS and by polarography.

Good agreement between the two techniques was observed at levels of 1.0 to 10.0 p.p.m.; however, below 1.0 p.p.m. AAS measurements were biased. The bias was overcome by increasing the sample size fourfold. For polarography the average

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6.85 (8.)

solidified cement and shell was examined by X-ray diffraction. Amino-acid analyses were made of the solidified cement and the shell. The shell and solidified cement were tested for chitin. The solidified cement was analyzed for iodotyrosine.

The solidified barnacle cement appears to be predominantly calcium carbonate in a proteinaceous matrix. The crystalline form of calcium carbonate was calcite. The elements P, S, Cl, K, Ca, Cr, Fe, and I were found in the solidified cement, unsolidified cement, and sea water. Sr was present in the solidified cement and in sea water. Chitin and iodotyrosine were also detected in the solidified cement.

The nitrogen content (N·6.25) of the solidified cement was 4.4% and of the unsolidified cement was 79.7%.

The amino-acid content of the protein fractions from the shell and from the solidified cement were significantly different, particularly with regard to their glycine content. The glycine content (expressed as residues/100 residues) in the solidified cement was 16.43 and in the shell was 30.04. These fractions also were high in acidic amino acids.

Stained thin sections of the solidified cement showed a laminated array of protein matrices surrounded by calcium carbonate (as calcite). The authors therefore suggest that the anionic groups on the matric proteins may serve as sites for nucleation during calcification.
[1 figure, 3 tables, 18 references] FTP

7.42 (8.42)

recovery from various species of fish was 100.7 plus or minus 9.0% and for AAS 95.7 plus or minus 9.2%.

The authors suggest that the polarography method may be used as the determinative step for lead levels of about 0.1 p.p.m.; AAS may be used at the 1.0 p.p.m. level. [4 tables, 15 references] SW

8.4 FLUORINE CONTENT OF SOME CHILEAN MARINE SPECIES

Lopez Etchegaray, Monica (Chile)
Chemical Abstracts 77, No. 1, 3967w (July 3, 1972)

5.122 (5.128)

Carotenoid provitamins are best utilized at low levels in the diet. As the level is increased the efficiency of conversion to vitamin A decreases markedly. Conversion depends on the animal species. Ratios of biological effectiveness of β-carotene for various species were summarized. The vitamin can be given as a daily supplement in feed or drinking water of the animals or by oral or parenteral routes. The greater amounts of vitamin A used today are blended in the dry feed. Application of fish oils for this purpose have been declining since the advent of synthetic vitamin A.

Use of the synthetic vitamin A has made available dry stable forms for mixture in feeds. The dry forms incorporate antioxidants and other ingredients which provide for physical stability in particle form with biological availability. In addition to dry feeds synthetic vitamin A may be used to supplement liquid feeds and also in drinking water.

Tables are included which show deficiency symptoms, functions, factors influencing requirement for, and animals requiring, vitamin A. Other tables summarize application forms, mode of administration, and stability data of the forms of vitamin A. In addition, a table gives the historical events associated with vitamin A from the years 1831 to 1970 with references.
[3 figures, 9 tables, 11 references] SW

7.42 DETERMINATION OF MERCURY IN TUNA-FISH.
II. IMPROVED METHOD OF DIGESTION

Carisano, A., M. Riva, and A. Daghetta
Industria Conserve 47, No. 2, 115-116 (1972) (In Italian)
BFMIRA Abstracts 25, No. 12, Abstract No. 4201, 482 (Dec. 1972)

The method of acid digestion of tuna prior to atomic absorption spectrophotometry to estimate mercury content reported previously (Ibid 1971, 46, 194) has been modified in order to avoid the possibility of a violent reaction being produced by the sealed vial containing the sample. C.C. Reprinted

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7.42 THREE METHODS FOR THE DETERMINATION OF MERCURY IN CANNED TUNA

Henrioul, A., et al.
Annls Falsif. Expert Chim. 65, No. 702, 274-278 (1972) (In French)
BFMIRA Abstracts 25, No. 12, Abstract No. 4202, 482 (Dec. 1972)

The 3 methods considered are colorimetric using dithizone, atomic absorption and nuclear reaction. Indications of the best methods are given. C.S.B. Reprinted

7.6 GAS CHROMATOGRAPHY OF THE FAT-SOLUBLE VITAMINS: A REVIEW

Sheppard, A. J., A. R. Prosser, and W. D. Hubbard (Division of Nutrition, Food and Drug Administration, Washington, DC 20204)
Journal of the American Oil Chemists' Society 49, No. 11, 619-633 (Nov. 1972)

This is a review of the published work on the application of gas-liquid chromatography (GLC) as an analytical tool for the determination of the fat-soluble vitamins A, D, E, and K. GLC has yet to be used to its full potential in this area.

The use of GLC methods to determine the vitamin A isomers has not been developed to any appreciable practical extent. The author suggests that liquid–liquid chromatography might be the method of choice. Practical GLC analysis for vitamin D may be feasible for pharmaceutical preparations. Use of GLC for vitamin E determinations are diverse, well defined, and are generally accepted in research laboratory work and for regulatory and quality control uses. GLC methods for vitamins K_1 and K_2 have not been developed on a practical basis. However, GLC methods are used for measuring vitamin K_3 (menadione and menadione sodium bisulfite) on a routine basis in quality control laboratories.

[10 figures, 100 references]

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7.9 (9.3)(3.3) IDENTIFICATION OF SPECIES OF HEAT-STERILISED CANNED FISH BY POLYACRYLAMIDE-DISC ELECTROPHORESIS

Mackie, I. M., and T. Taylor (Ministry of Agriculture, Fisheries and Food, Torry Research Station, P.O. Box 31, 135 Abbey Road, Aberdeen, AB9 8 DG, Scotland)
Analyst 97, No. 1157, 609-611 (Aug. 1972)

Electrophoresis of the water-soluble proteins of fish muscle is a sensitive method used for identifying fish species; it is also used to identify species of portions such as fillets. Initially the method was limited to raw or partially cooked fish. A modification of the method made possible species identification of heat-sterilized canned fish.

The modification of the initial method is based on the specific cleavage of the methionyl peptide bonds of heat-sterilized proteins with cyanogen bromide to release protein fragments that can be extracted with 6 M urea solution.

A portion of canned fish was added to 100 ml. of a 70% formic acid solution containing 2.5 g. cyanogen bromide. The suspension was shaken for a few minutes and allowed to stand for 24 hr. The residue recovered from rotary evaporation was suspended in distilled water, dialyzed in running water for 24 hr., and evaporated to dryness. The residue was suspended in 10 M urea solution and allowed to stand overnight. The clear solution obtained after centrifugation was retained for electrophoresis. Samples of eight species of canned fish were subjected to the treatment.

Electropherograms of the eight species were distinguishable from one another and reproducible for each species. The patterns were characterized by many well-separated zones that have similar intensities of staining. The authors concluded

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7.9 (6.199)(6.134) N-NITROSODIMETHYLAMINE IN FISH MEAL

Sen, Nrisinha P., Leander A. Schwinghamer, Barbara A. Donaldson, and Walter F. Miles (Food Division, Health Protection Branch, Dept. of National Health and Welfare, Ottawa, K1A OL2, Canada)
Journal of Agricultural and Food Chemistry 20, No. 6, 1280-1281 (Nov.-Dec. 1972)

In 1971, R. J. Kirk (Experimental Fur Farm, Winnipeg, Canada) informed the present authors of the death of a large number of mink in Canadian farms. This information prompted the authors to examine mink feeds for nitrosoamines. These compounds are highly toxic to fur-bearing animals. Some of the feeds fed to the mink contained herring meal, but according to the manufacturers the meals had not been preserved with nitrate or nitrite. Some of the feeds were also examined for nitrate and nitrite. This article reports on the results of these analyses.

The results are presented in the table that follows. Six of the seven feeds and meals contained considerable amounts of N-nitrosodimethylamine (DMN). Small amounts of nitrate and no nitrite were detected in these samples. It is not clear how the DMN was formed in the absence of nitrite. One possibility is that small amounts of nitrite naturally present in the raw fish could have contributed to the formation of DMN, but such a small amount of nitrite would be completely destroyed by reaction with various amino compounds in the fish meal. The authors speculate that the hot fire gases from the combustion of fuel oils could be another source of nitrite. F. Ender and L. Ceh [Alkierende Verbindugen, Second Conference of Tobacco Research, Freiburg, Germany (1967), p. 83] stated that stack gases from fuel

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7.599 (8.59) DETERMINATION OF PHENOLIC WOOD SMOKE COMPONENTS AS TRIMETHYLSILYL ESTERS

Kornreich, Mary R., and Phillip Issenberg (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Agricultural and Food Chemistry 20, No. 6, 1109-1113 (Nov.-Dec. 1972)

Earlier work on wood smoke and smoked foods provided estimates of total phenolic compounds, but quantitative data were not available because of the lack of an appropriate analytical method. Gas chromatographic (GC) separation of free phenols is complicated because these compounds are polar in nature and have low volatility. The chromatographic peaks of phenols tend to be asymmetric; also, long times and high temperatures are required to elute some of the higher boiling phenols. However, peak symmetry in GC of phenolic compounds can be improved by forming derivatives of them having higher volatility and lower polarity. Silylating reagents, for example, react with hydroxyl, carboxylic acid, amine, and mercaptan groups by replacing the active hydrogens with trimethylsilyl (TMS) groups. By blocking the hydroxyl groups of the phenolic compounds, the formation of intermolecular hydrogen bonds is inhibited, and, as a result, the interaction of the derivatives with the solid support and apparatus surfaces are reduced, and peak symmetry is improved. In this work, the authors developed quantitative methods for the GC determination of trimethylsilyl derivatives of wood smoke phenols. The method was applied to wood smoke condensates and to model food components exposed to smoke vapor.

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7.9 (6.199)(6.134)

oil contain up to 1,000 p.p.m. of nitrogen oxides and the industrial use of such gases for drying fish meal may lead to the formation of DMN.

Sample	N-Nitroso-dimethyl-amine (DMN)	Nitrate [1]	Nitrite
	p.p.m.	p.p.m.	p.p.m.
Mink feed	0.40	--	
	0.18	22	ND
Herring meal, whole	0.30	--	
	0.42	22	ND
	0.45	17	ND
Fish meal	ND [2]	13	ND
	0.12	--	

[1] Results expressed as sodium salt.
[2] ND = not detectable. Detection limit for MDN is 0.01 p.p.m. and for nitrite is 0.1 p.p.m.

[2 figures, 1 table, 25 references] FTP

7.599 (8.59)

The phenolic components were isolated by conventional methods based on acidity and the methods were described earlier [P. Issenberg, M. R. Kornreich, and O.A. Lustre, J. Food Sci. 36, 107 (1971)]. The phenolic fractions were treated with N,O-bis(trimethylsilyl)trifluoroacetamide at room temperature to form trimethylsilyl ethers. 3,5-Dimethylphenol was added as an internal standard to eliminate volumetric errors in gas chromatographic injection. Phenol, guaiacol, 4-methylguiaiacol, and syringol were the major components in the vapor phase of wood smoke. Quantitative data are given in the table that follows.

Compound	Whole wood smoke [1]	Wood smoke vapor phase [1]	Oil model [2]	Water model [2]
	µg./l.	µg./l.	µg./g.	µg./g.
Phenol	59.4	5.9	33.1	29.2
Guaiacol	417	32.1	176	77.7
4-Methylguaiacol	333	13.6	241	24.2
Syringol	392	6.5	102	68.5

[1] The whole smoke and the vapor phase were collected for 2 hr.
[2] The models, triolein solution and water were exposed to smoke vapor for 2 hr.

[2 figures, 2 tables, 17 references] FTP

.599 (9.19) INTERFACING OF AN ATOMIC ABSORPTION SPECTROPHOTOMETER WITH A GAS-LIQUID CHROMATOGRAPH FOR THE DETERMINATION OF TRACE QUANTITIES OF ALKYL MERCURY COMPOUNDS in FISH TISSUE

Gonzales, J. G., and R. T. Ross (Environmental Protection Agency, Perrine Primate Laboratory, P.O. Box 490, Perrine, FL 33157)
Analytical Letters 5, No. 10, 683-694 (1972)

Because there are differences in the degree of toxicity between inorganic and organic forms of mercury, it is essential to determine not only the total mercury content but also the relative proportions of the different forms of the element present in the materials under examination. Methods are available for the determination of organic forms of mercury by gas-liquid chromatography using an electron capture detection system, but they involve a cleanup procedure for separation of the methyl mercury compound from other interferring substances. Recently, J. E. Longbottom [Anal. Chem. 44, 1111 (1972)] described a mercury specific gas chromatographic detector for the determination of dialkyl mercury compounds. In the present study, the authors modified this system to achieve maximum sensitivity. This report describes a method for the determination of alkyl mercury compounds based on gas-liquid chromatography separation, reduction of the organic mercury compounds by combustion, and measurement of the resulting atomic vapor by atomic absorption spectroscopy. The method was used for the determination of organic mercury compounds in fish tissue. The method possesses both sensitivity and specificity and does not require a cleanup step. It is adequate for monitoring levels of methyl mercury in fish tissue.
[5 figures, 2 tables, 16 references] FTP

7.9 (9.3)(3.3)

that a proportion of the fragments of protein released by reaction with cyanogen bromide are of a size that is suitable for separation by electrophoresis; furthermore, species specific patterns indicated genetically determined differences still exist at this level of protein structure.

The authors suggest that the method has potential value in the identification of canned or otherwise heat-treated fish products.

[1 figure, 12 references] SW

Chemical Abstracts 77, No. 9, 57191g (Aug. 28, 1972)
Chernyshova, V. M. (Inst. Gidrobiol., Kiev, U.S.S.R.)

7.9 (9.19) GUPPY AS AN OBJECT USED TO DETERMINE THE ACTION OF TOXIC SUBSTANCES ON FISH

8.8 PER CENT FATTY ACID COMPOSITION AND QUALITY DIFFERENCES OF CHINOOK AND COHO SALMON

Iverson, John L. (Division of Food Technology, Food and Drug Administration, U.S. Health, Education and Welfare, Washington, DC 20204)
Journal of the Association of Official Analytical Chemists 55, No. 6, 1187-1190 (Nov. 1972)

During the migration of chinook and coho salmon (from the Pacific Ocean) up the shallow fresh-water streams, the fish do not consume food but use their body reserves. These fish at the time of spawning are in fairly poor condition and quality. Recently artificial propagation practices have made available large quantities of salmon. The captured mature fish are stripped of their roe and the remaining fish are then made available to the market. These "spent" salmon can be canned or otherwise processed and sold without any special label requirements. The present study was undertaken to devise a chemical test, based on composition of the lipid constituents, to distinguish between regular salmon and the so-called spent salmon.

During their migration period the salmon utilize fat stored in their tissues for energy and for final development of the roe. Degenerative changes, therefore, take place in their visceral organs and the oil content of the tissues is reduced. It has been suggested that this catabolism results in changes in oil constituents; the long chain monounsaturated fatty acids 20:1 and 22:1 would be utilized before the shorter chain acids and the polyunsaturated acids. Furthermore, there should be a significant change in the relative amounts of the multibranched acids (which are normally present in relatively large amounts in marine oils).

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9.11 SOUND-SCATTERING LAYERS IN THE NORTHEASTERN PACIFIC

Donaldson, Henry A. (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881), and William G. Pearcy (Dept. of Oceanography, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 29, No. 10, 1419-1423 (Oct. 1972)

Sound-scattering layers exist in midwater regions of most of the oceans of the world. Little information, however, is available on the seasonal and spatial variations of the sound-scattering layers in one region. Various types of organisms may cause scattering, and these include squids, euphausiids, fishes, and siphonophores. Also, scattering may be caused by more than one group of organisms. In this study, the migrations of the scattering layers and the changes in scattering from day to night, from season to season, and from inshore to offshore were examined off the Oregon coast over a period of several years. The relations between scattering and the biomass of various groups of animals were also determined on a scientific cruise between Hawaii and Adak, Alaska. The temporal and spatial variations in the depth, thickness, and vertical movements of the sound-scattering layers were obtained with the use of a 38.5 kHz echosounder.

Off the coast of Oregon, one or two layers migrated toward the surface of the sea at dusk and descended deeper in the water at dawn. The individual scattering layers migrated at a fairly constant rate during a twilight period, but the rates of ascent and descent varied from day to day. The average rates of migration were 2 to 3 m./min. At night, the depth of the top of the scattering layer averaged about 40 m.; during the day it varied between 50 to 245 m. The depth of the bottom of the deepest recorded scattering layer was 450 m.

(over)

9.12 MIGRATION OF YEARLING SOCKEYE SALMON (ONCORHYNCHUS NERKA) AS DETERMINED BY TIME-LAPSE PHOTOGRAPHY OF SONAR OBSERVATIONS

Groot, C. (Fisheries Research Board of Canada, Pacific Biological Station, Nanaimo, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 10, 1431-1444 (Oct. 1972)

Sockeye salmon usually spawn in creeks or rivers adjacent to lakes. In this study, the authors examined the migration of sockeye salmon smolts from nursery areas (Babine Lake system) to their outlet by a combination of a high-frequency sonar and time-lapse photography. Frame-by-frame analyses of the films provided information on the speed, direction, and diurnal timing of the sockeye smolts during a 24-hr. period.

The migratory activity of the smolts in the lake centered around dusk and dawn; this pattern was similar to the one near the outlet where the smolts entered the river on their way to the sea.

The speed of movement of the smolts was from 19 to 51 cm./sec. (mean 30 cm./sec.), and the greatest speeds were at dusk and dawn.

The most direct movements of smolts were at twilight, when the migration activity was at its highest. The directional tendencies of movement were consistent with the shortest route to the outlet. In one area (at the junction between the main lake and two arms), the author noted that smolt movements were made that would lead the fish away from the outlet. He suggests that determination of direction must be largely innate because the smolts are migrating for the first time through areas to a goal where they have never been.

[8 figures, 2 tables, 10 references] FTP

9.125 USE OF OTOLITHS IN IDENTIFYING HERRING STOCKS IN THE SOUTHERN GULF OF ST. LAWRENCE AND ADJACENT WATERS

Messieh, Shoukry N. (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 8, 1113-1118 (Aug. 1972)

The use of otolith (small, calcareous discs of the inner ears of vertebrates) characters has proven useful in distinguishing herring stocks in the southern Gulf of St. Lawrence. Previously, otolith characteristics that varied with environmental changes were used for distinguishing fish stocks. A new method, using otolith characters that are little affected by the environment, has been developed that promises greater reliability.

Two otolith types are described: a sping-type (S) and an autumn-type (A). The S-type is characterized by having pararostrum and postrostrum (two protuberances at the rear end of the otolith--pararostrum dorsal and postrostum ventral) of approximately equal length and a well-developed excisura minor (a narrow groove separating pararostrum from postrostrum). The A-type is distinguished by a very poorly developed excisura minor and having the postrostrum longer than the pararostrum. Although minor differences occur within each type among different specimens, they exert no major effect on the distinguishing features mentioned above.

The validity of using otoliths to separate herring stocks was supported by comparison with relations of otolith length to fish length and with fin ray counts. Regression lines for otolith length on fish length were different between otolith types and localities, indicating the presence of more than one stock. Minor differences within each otolith type support this finding. Mean counts of pectoral

(over)

9.16 (1.86) IMPROVEMENTS IN OR RELATING TO METHODS OF CULTURING SHRIMP ARTIFICIALLY

Spencer, G. E. (pat.)
British Patent 1,291,991
BFMIRA Abstracts 25, No. 12, Abstract No. 4502, 552 (Dec. 1972)

Diatoms are grown on the upper levels of saline water to a concentration which avoids direct sunlight reaching the bottom. The shrimp are hatched and cultured at least through the zoea stage in this water. The diatoms are circulated through the water and the larvae are fed first on the diatoms and later on invertebrates. An oxygen content of at least 2.5 cc/litre is maintained in the water. Reprinted

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7.85 (8.8) BACTERIAL STUDIES ON THE THAWING OF FROZEN FOODS

Kozima, T. T., et al.
Refrigeration, Japan 46, No. 529, 13-18 (1971) (In Japanese)
BFMIRA Abstracts 25, No. 12, Abstract No. 4249, 494 (Dec. 1972)

The bacterial viability in commercially frozen foods after thawing is considered. The viable bacterial count of frozen sea foods was very high and it was shown that the count of some prepared frozen foods did not decrease when warmed for thawing, but cooking resulted in a decreased bacterial count. Some prepared frozen foods could have a lower bacterial count by prolonging the time of thawing before subsequent cooking. J.A.D. Reprinted

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9.19 (0.35) MECHANISMS FOR SYNTHESIS OF ORGANIC MERCURY FOUND IN FISH

Anonymous
Nutr. Rev. 30, No. 1, 16-18 (1972)
BFMIRA Abstracts 25, No. 5, Abstract No. 1699, 345 (May 1972)

In this review article, two pathways for the synthesis of methyl mercury are described. In the first, non-enzymic methylation in the presence of methyl cobalamine and mercuric chloride occurs. The alternative route has been proposed for organisms with no requirement for vitamin B_{12} or its derivatives. This appears to be a detoxification reaction involving one or more steps in the methionine biosynthesis pathway and resulting in the methylation of mercury. L. P. Reprinted

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9.15 OCCURRENCE AND TOXICITY OF A RED TIDE CAUSED BY NOCTILUCA SCINTILLANS, IN THE COASTAL WATERS OF HONG KONG

Morton, Brian, and P. R. Twentyman (Dep. Zool., Univ. Hong Kong, Hong Kong)
Chemical Abstracts 77, No. 9, 57371r (Aug. 28, 1972)

9.16
(9.1)

PRIMI RISULTATI POSITIVI DI FECONDAZIONE ARTIFICIALE NEL BRANZINO (DICENTRARCHUS LABRAX) SU VASTA SCALA [FIRST POSITIVE LARGE SCALE RESULTS ON THE ARTIFICIAL INSEMINATION OF SEA BASS (DICENTRARCHUS LABRAX)]

Arcarese, Gaetano, Gino Ravagnan (Capo Laboratories, Centro Ittiologico Valli Venete, 45010 Cà Venier, Rovigo, Italy), and Pietro Ghittino (University of Georgia, School of Veterinary Medicine, Dept. of Medical Microbiology, Athens, GA 30601)
Rivista Italiana Piscicoltura e Illiopatologia (The Italian Magazine of Fish Breeding and Fish Pathology) 7, No. 2, 27-33 (Apr.-May-June 1972) (Published by Italian Fish Culture Association, Via Indipendenza, 5-31100 Treviso, Italy) (In Italian; English and German Abstracts)

[In northeastern Italy the town of Cà Venier lies on a channel of the delta of the River Po on the coast of the Adriatic Sea. Aquaculture of sea bass in fenced lagoons in the estuaries of the Po is practiced in this region.]

Studies undertaken to intensify production of sea bass included attempts at artificial propagation.

A group of male and female sea bass were taken from a lagoon; those which were sexually mature were selected and placed in indoor tanks supplied with filtered, recirculated sea water at 36‰ salinity, and at 16° to 18° C.

After the fish had become acclimated, the females were injected with carp pituitary extracts consisting of prepared carp hypophysis.

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9.19
(0.5)

FATE OF DDT IN SEVERN ESTUARY SEDIMENTS

Albone, Eric S., Geoffrey Eglinton, Nigel C. Evans, Judith M. Hunter, and Michael M. Rhead (Organic Geochemistry Unit, School of Chemistry, University of Bristol, Bristol, BS8 1TS, England)
Environmental Science & Technology 6, No. 10, 914-919 (Oct. 1972)

Although microbiological degradation processes may help reduce environmental pollution caused by use of persistent pesticides, detailed studies on the degradation pathways are necessary to assess the amount of hazard associated with degradation products.

Experiments were performed to study the ability of the sediments of a major British estuary to degrade p,p′-DDT; radiolabeled p,p′-DDT was used to follow the pathway of the degradation products. Incubations were performed with p,p′-DDT in sediments in situ and in the laboratory and in anaerobic sewage sludge.

For the in situ experiments a hole in the estuarine sediment was made by coring; a solution of ^{14}C-p,p′-DDT was dispersed in the bottom of the hole, and the core was replaced. After incubation for 46 days at temperatures varying between 5° and 25° C., the contents of the core were removed and extracted.

For comparative laboratory studies, samples of the darker, lower mud were collected with estuary water taken from nearby pools. A slurry of the mud and water was injected with ^{14}C-p,p′-DDT; the preparation was incubated anaerobically under hydrogen for 3 weeks at 25° C.

Incubation of ^{14}C-p,p′-DDT in anaerobic sewage sludge under hydrogen was performed at 35° C. No pesticide residues were found in extracts of control samples of sewage sludge or of estuarine mud from the sampling site.

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9.19
(9.3)

PIEZOELECTRIC DETECTORS FOR ORGANOPHOSPHORUS COMPOUNDS AND PESTICIDE

Scheide, Eugene P., and George G. Guilbault (Dept. of Chemistry, Louisiana State University, Lakefront Campus, New Orleans, LA 70122)
Analytical Chemistry 44, No. 11, 1764-1768 (Sept. 1972)

There is a need for sensitive, selective monitoring devices to detect toxic substances in the environment. Other work had shown that the piezoelectric detector has these characteristics. It consists of a vibrating quartz crystal coated with a substrate that is capable of interacting selectively with a component of interest in a static system or flowing gas stream. The frequency of the crystal is dependent on the weight of the coating and the weight of a vapor adsorbed onto the coating. The concentration of a pollutant in the air can be measured by changes in the frequency of the crystal caused by adsorption by the coating of the pollutant.

The major part of the study was performed with a model compound (as the coating material) which is similar to regular organophosphorus pesticides in complexing ability but low in toxicity.

Studies conducted to determine the optimum conditions for the detector indicated that the greatest stability occurred when it was operated continually and with all the components properly shielded. Variations in room temperature did not materially affect the detector system.

The frequency of the crystal decreases as the coating mass increases until the crystal is overloaded and then it ceases to vibrate. This cutoff point is

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9.19
(8.42)

MERCURY CONTENT OF SPINY DOGFISH (SQUALUS ACANTHIAS) IN THE STRAIT OF GEORGIA, BRITISH COLUMBIA

Forrester, C. R., K. S. Ketchen (Fisheries Research Board of Canada, Biological Station, Nanaimo, British Columbia, Canada), and C. C. Wong (Fish Inspection Laboratory, Fisheries Service, Vancouver, B.C., Canada)
Journal of the Fisheries Research Board of Canada 29, No. 10, 1487-1490 (Oct. 1972)

In January 1971, a commercial shipment of the flesh of the spiny dogfish (taken in the Strait of Georgia) was held up because the flesh contained more than 0.5 p.p.m. of mercury. A sampling program was then initiated of the dogfish from the area to determine whether or not there was a systematic pattern of mercury content in these fish.

The total mercury content of the dogfish from the Strait of Georgia reached a level of 0.5 p.p.m. at fish length of 72 cm. for male fish and at fish length of 77 cm. for female fish. For any fish length above 65 cm., the mercury content of the flesh was higher for the male fish than for the female fish; furthermore, the mercury content was higher for dogfish samples taken off the Fraser River Estuary than for samples taken in other areas of the strait. The mercury content of the dogfish reached 1.7 p.p.m. in male fish (to 95 cm. in total length) and almost 2.0 p.p.m. in female fish (to 120 cm. in total length).

The reasons for the difference in mercury content between the male fish and the female fish are not understood. Furthermore, the rate of mercury uptake in dogfish is not yet known.

[2 figures, 2 tables, 6 references] FTP

9.19 (9.3)

important in determining the optimum weight of substrate to be applied to the crystal. A slightly larger amount of substrate can be added before cutoff occurs if the crystal is coated on both sides. The cutoff frequency for 9 MHz crystals was found to be 242,065 c.p.s. at 605.16 μg. of substrate, single side; and 321,747 c.p.s. at 804.37 μg. of substrate coated on both sides. Coating substrate on both sides of the crystal substantially increased sensitivity. When a fresh coating of substrate was to be used it was found necessary to expose it to an organophosphorus compound repeatedly until chemisorption complexation at the surface of the substrate was complete. Subsequent to the formation of the chemisorption layer, the process is a completely reversible physisorption of the organophosphorus compounds to be tested.

Tests were performed on other common constituents and pollutants of the atmosphere as possible interferences with the detection system. The results indicate interference was nonexistent or minor.

The detector has potential use as an air pollution sensor and as a specific gas chromatography detector. A flow diagram and an electrical schematic of the detector are shown.

[6 figures, 2 tables, 25 references] SW

9.19 CELLULOSE SPONGE FOR REMOVING OIL SLICKS

Marx, John W. (Phillips Petroleum Co.)
U.S. Patent 3,677,982 (July 18, 1972)
Chemical Abstracts 77, No. 18, 116287t (Oct. 30, 1972)

9.1 STANDARDIZATION OF $Na_2{}^{14}CO_3$ SOLUTIONS FOR PRIMARY (9.16) PRODUCTIVITY MEASUREMENTS IN WATERS

Findeneß, J. (Klagenfurt, Austria)
Chemical Abstracts 77, No. 8, 52187a (Aug. 21, 1972)

9.16 (9.1)

The fertilized eggs were kept for 15 to 18 days at a temperature of 16° to 18° C. (which was found to be an optimum range). About 4 to 5 million larvae were hatched. This amount represents a hatch rate of about 80%.

After 60 days the sea bass fry appeared to be disease free. They were about 25 mm. in length. Methods to improve feeding of the young fry are being investigated. [14 photographs, 5 references] SW

9.19 MERCURY IN THE PULP AND PAPER MILL ENVIRONMENT -- APPRAISAL AND PERSPECTIVE

Marton, Joseph, and Terezia Marton (Westvaco Corp., Laurel Research Center, Laurel, MD 20810)
TAPPI (Journal of the Technical Association of the Pulp and Paper Industry) 51, No. 11, 1614-1618 (Nov. 1972)

Mercury discharges into the environment by five pulp and paper mills were examined. The U.S. pulp and paper industry no longer uses mercurials; however, some of its main raw materials contain mercury as a contaminant. Apparently, the most significant mercury discharge occurs through the burning of coal (1 to 2 lb. of Hg/1,000 ton of pulp). The industry's share of the coal burned is about 2% and the industry's share in airborne mercury pollution is about the same percentage. The pulp and paper industry discharges only about 0.1 lb. of Hg/1,000 ton of pulp into the waterways. The mercury content of some paper and board products runs about 0.1 p.p.m. In the United States about one-fourth of the paper production is incinerated. However, if all the paper products were burned only about 14 tons of Hg would be released into the atmosphere, a small fraction of the airborne mercury released by fossil fuel burning. Apparently, the paper industry does not contribute substantially to mercury pollution.

[7 tables, 15 references] FTP

9.19 (0.5)

After incubation, the samples were centrifuged. The supernatant was scintillation counted, and the residue was subjected to continuous Soxhlet acetone extractions at 56° C. for over 20 hr.

Gas-liquid chromatography analysis and radioscanning of the total extract from the in situ incubations indicated only a slight degradation of p,p'-DDT to p,p'-DDD. In contrast, laboratory incubations of p,p'-DDT in estuarine sediments produced greater conversion to p,p'-DDD. Incubation of p,p'-DDT with anaerobic sewage sludge caused the most extensive breakdown to p,p'-DDD. The numbers of aerobic bacteria in the sediment were approximately 10^6 to 10^7 organisms/gram of wet mud; anaerobic bacteria counts were usually around 10^5 to 10^6 organisms/gram. Compared with controls, DDT (mixed isomers) at 100 p.p.m. in nutrient agar consistently reduced the aerobic and anaerobic bacterial counts. Tests indicated that bacteria isolated from estuarine mud and inoculated into nutrient broth containing 10 p.p.m. of DDT were able to degrade the DDT. The cultures were incubated in the dark at 20° C. under regular aerobic conditions and no attempt was made to prevent the development of anaerobic conditions locally as a result of rapid bacterial growth in the broth culture.

[1 figure, 5 tables, 33 references] Mary Ellen Engett

9.19 MERCURY LEVELS IN MUSCLE TISSUES OF PRESERVED MUSEUM FISH

Evans, Ronald J., Jack D. Bails (Fish Division, Michigan Dept. of Natural Resources, Lansing, MI 48926), and Frank M. D'Itri (Institute of Water Research and Dept. of Fisheries and Wildlife, Michigan State University, East Lansing, MI 48823)
Environmental Science & Technology 6, No. 10, 901-905 (Oct. 1972)

Mercury contamination has recently been discovered in fish populations of the Lake St. Clair-Western Lake Erie area of the Great Lakes. This study was undertaken to determine the prior duration and the extent of contamination.

Preserved museum fish taken from the Lake St. Clair-Western Lake Erie region between the years 1920 and 1965 were compared to fresh fish obtained from the same area in 1970-71 for mercury levels. After determination of mercury levels, the fish were placed into one of four categories according to 1970 mean mercury levels in parts per million: I, > 3.0; II, 2.0-3.0; III, 0.5-2.0; and IV, < 0.5. These values were then plotted against years for both Lake St. Clair fish and Lake Erie fish. Category I had only one fish from Lake Erie, but contained several fish from Lake St. Clair. All Category I fish had high mean levels of mercury prior to 1945 and showed a slight increase between then and 1970. Therefore only Categories II, III, and IV will be considered, as a group.

Prior to 1945 in Lake St. Clair, all categories (II, III, IV) showed low mean levels of mercury. In 1965, these categories showed elevated mercury levels and by 1970, all showed greatly elevated levels.

(over)

9.19 ABANDONED LARVACEAN HOUSES: A UNIQUE FOOD SOURCE IN THE PELAGIC ENVIRONMENT

Alldredge, Alice L. (Graduate Group in Ecology, University of California, Davis, CA 95616)
Science 177, No. 4052, 885-887 (Sept. 8, 1972)

Larvaceans are pelagic tunicates of the class Appendicularia, and they are one of the most common members of marine zooplankton. The larvaceans filter out nannoplankton through a unique feeding structure named the "house." This house is secreted around the animal by the oikoplast epithelium of the animal body. When the filters of the house clog with algae and particles of detritus, the animal abandons the house and builds a new one. Some larvaceans build a new house every 4 hr.; others, every 2 hr. Apparently, the ecological significance of these abandoned larvacean houses has not been considered previously. This article reports on the observations, field and laboratory, of copepods feeding on the clogged filters of abandoned larvacean houses in the open ocean.

Field tests were made in the Florida Current 6 to 10 km. west of Bimini, Bahamas, in 10 to 15 m. of water by use of conventional scuba techniques. The houses of Oikopleura longicauda, O. fusiformis, and Megalocercus abyssorum were found to be the most abundant. Up to 33% of the abandoned larvacean houses had various copepods resting on the incurrent filters or associated with the inner apparatus. Laboratory tests showed that the copepod Oncaea mediterranea actually feeds on the larvacean houses. In the course of the study, techniques for the photographing of the larvacean houses in the field were developed. The one photograph in the article shows the head-on view of M. abyssorum in its house.

(over)

9.19 DISAGREEMENTS ON WHY BROWN PELICAN EGGS ARE THIN

Hazeltine, William (26 Rosita Way, Oroville, CA 95965)
Nature 239, No. 5372, 410-411 (Oct. 13, 1972)

The author disagrees on four points with the proposal by Blus, et al. [L. J. Blus, C. D. Gish, A. A. Belisle, and R. M. Prouty, Nature 235, 376 (1972) and L. J. Blus, R. G. Heath, C. D. Gish, A. A. Belisle, and R. M. Prouty, Bio-Science 21, No. 24, 1213 (1971)] that DDE is the probable cause of thin eggshells in brown pelicans. Data are presented that appear to completely refute the contention that DDE causes thinning of brown pelican eggshells. Pertinent data extracted from table 1 of the article are as follows:

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9.19 ACUTE ZINC TOXICITY TO RAINBOW TROUT (SALMO GAIRDNERI): CONFIRMATION OF THE HYPOTHESIS THAT DEATH IS RELATED TO TISSUE HYPOXIA

Burton, Dennis T., Alma H. Jones, and John Cairns, Jr. (Dept. of Biology and Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061)
Journal of the Fisheries Research Board of Canada 29, No. 10, 1463-1466 (Oct. 1972)

The toxicity of heavy metals to fish has been attributed to the coagulation or precipitation of mucus on the gills and to cytological damage to the gills; there appears to be a breakdown in gas exchange at the gills. However, J. F. Skidmore [Quart. Rev. Biol. 39, 227-247 (1964)] suggested that death in fish with gills damaged by heavy metals is probably caused by tissue hypoxia. The purpose of the present study was to test this hypothesis. Rainbow trout were exposed to lethal levels of zinc sulfate in water nearly saturated with oxygen, and changes in the lactic acid and pyruvic acid concentrations in the skeletal muscle and liver tissue were measured.

When rainbow trout are exposed to acute toxicity levels of zinc, tissue hypoxia appears to be a major physiological change preceding death. Apparently, gill damage modifies gas exchange and creates hypoxia at the tissue level--supporting Skidmore's earlier hypothesis. Other heavy metals similar to zinc appear to kill certain species of fish when the fish are exposed to acute toxicity levels of the metals; therefore, the authors believe that death related to tissue hypoxia may also be occurring in these species.

[2 tables, 17 references]

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Brown pelican (Anacapa Island, Calif.) egg data

Date collected	Weight of yolk	Lipid content of yolk	Thickness of shell	Incubated	Residue of p,p'DDE in whole yolk	Calculated content of p,p'DDE on lipid basis
	g.	%	mm.		p.p.m.	p.p.m.
18/4/69	15.1	21.8	0.42	no	357.5	1,640
	38.7	6.3	0.38	yes	61.1	970
	15.3	23.7	0.37	no	204.4	860
	17.5	22.9	0.37	no	232.1	1,010
27/5/69	13.6	26.2	0.36	no	178.4	680
	16.8	26.9	0.34	no	183.0	680
	47.9	4.4	0.40	yes	55.8	1,270
	25.3	12.2	0.40	yes	143.4	1,172
	49.7	2.8	0.38	yes	29.4	1,045

Although the popular press and scientific literature have established that DDE is the cause of thin eggshells of brown pelican or peregrine, the author believes that the underlying data to test the conclusion are just now becoming available and do not support such a conclusion.
[3 tables, 8 references] FTP

9.19 MULTI-DISCIPLINARY STUDY OF WATER QUALITY RELATIONSHIPS:
(9.2) A CASE STUDY OF YAQUINA BAY, OREGON

Castle, Emery N., Stoevener, Herbert H., Joe B. Stevens, and Howard F. Horton (Oregon State University, Corvallis, OR 97331), Adam Sokoloski (Environmental Protection Agency, Washington, D.C.), and Loys Parrish (Environmental Protection Agency, Cincinnati, Ohio)
Special Report 348, Agricultural Experiment Station, Oregon State University, Corvallis, OR 97331 (Feb. 1972), 135 pp.

This report deals basically with the problem of how a community or a geographic area manages the economic activity which affects its environmental quality. Various specific issues included: (1) the economic value of outdoor recreational activity to a community, (2) the direct and indirect economic effects on a community of alternative levels of water quality resulting from industrialization, (3) the institutional means by which a community may manage the natural resources at its disposal, and (4) the management alternatives open to a community resulting from unique local conditions.

Chapter I is the Introduction. Chapter II discusses how the demand for and value of the recreational fishery in Yaquina Bay were estimated. Chapter III discusses the economic impact of the current level of recreational activity upon the study area. Chapter IV contains an analysis of relevant alternative waste disposal methods in Yaquina Bay. Chapter V is an assessment of the biological consequences of these alternative waste disposal schemes, and Chapter VI contains an economic evaluation of the alternatives. Chapters VII and VIII deal with water quality management institutions and some broad interpretations of the results of this study in relation to public policy in water quality management.
[63 references] FTP

9.19

Lake Erie fish, prior to 1937, showed low mercury levels which increased slightly during the 1942-1964 period. By 1970-71, the mercury levels had increased substantially.

The current Food and Drug Administration action level is 0.5 parts per million mercury in fish. All categories (except I) were below this level up to 1965 in Lakes Erie and St. Clair. Between 1965 and 1971, all categories exceeded that level except Category IV fish from Lake Erie.
[3 figures, 1 table, 13 references] Lee Thorson

9.19

The results of the study have four implications. (1) The following avenues of the pelagic food web are revealed:

Nannoplankton → (Larvacean houses) → Copepods and other crustaceans → Carnivores

Furthermore, this food chain may be significant. (2) Abandoned larvacean houses, mucus feeding webs of pelagic gastropods, and organic aggregates provide numerous microsurfaces that are benthic in nature and suitable for benthic feeding methods. (3) Because of the abundance of abandoned larvacean houses in the sea, they may be a major source of particulate organic matter. (4) Because larvacean houses are destroyed or filtered through most conventional planktonic nets, they must be observed directly if their biology is to be understood.
[1 photograph, 1 table, 9 references] FTP

Zitko, V. (Biol. Stn., Fish. Res. Board Canada, St. Andrews, New Brunswick, Can
Chemical Abstracts 77, No. 9, 57227y (Aug. 28, 1972)

Gusev, A. G. (U.S.S.R.)
Chemical Abstracts 77, No. 10, 65984h (Sept. 4, 1972)

9.2 INDUSTRIAL APPLICATIONS OF TECHNOLOGICAL FORECASTING: ITS UTILIZATION IN R & D MANAGEMENT

Cetron, Marvin J., and Christine A. Ralph
Published by Wiley-Interscience, New York, N.Y. (1971), 563 pp.
Joseph P. Martino (reviewer)
Technological Forecasting and Social Change 4, No. 1, 112-115 (1972)

This book is directed toward industrial applications of technological forecasting. It is divided into two sections. The first consists of the results of a questionnaire survey of industrial use of technological forecasting and a set of case studies based on interviews with industrial respondants. The second consists of a series of contributed essays on various aspects of technological forecasting. This book is not a comprehensive coverage of technological forecasting methods nor of information on how to carry out the implementation of such methods in industry. It is lacking, too, in treatment of non-R&D applications of technological forecasting in industry, such as analysis of mergers and acquisitions, new venture analysis, forecasting changes in methods or processes, forecasting changes in management techniques, and the identification of new markets. There is still a need for a book that treats, comprehensively, the use of technological forecasting in industrial applications.
[3 references] FTP

9.3 LONDON CONFERENCE AGREES ON OCEAN DUMPING CONVENTION
(9.19)

Train, Russell E. (Council on Environmental Quality)
Department of State Bulletin 67, No. 1747, 710-717 (Dec. 18, 1972)

An intergovernmental conference which met at London October 30-November 13 agreed on the text of a Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. [This article contains a statement by Russell E. Train, Chairman of the Council on Environmental Quality and head of the U.S. delegation to the conference, issued at London on November 13 and the text of the convention, with annexes.]

Such an agreement [Convention on Ocean Dumping] has been a major policy objective of the United States. The new agreement is a strong and effective measure which represents a historic step toward the control of global pollution.

The framework of the convention is quite simple. It recognizes that the health of the marine environment is of vital importance to mankind. It requires governments to regulate dumping, including monitoring. Certain very harmful substances, such as certain pesticides, persistent oils, high-level radioactive wastes, persistent plastics, cadmium, mercury, and their compounds, et cetera, are prohibited to be dumped entirely. Another group of wastes are to be dumped only under special conditions, requiring special permits. These include cyanide and fluoride wastes and other materials containing certain heavy metals such as arsenic, lead, and chromium. Finally, all other substances will require general permits. Thus, all matters dumped into the oceans will be brought under regulation.

 (over)

9.2 EMERGING PATTERNS IN NEW VENTURE MANAGEMENT

Jones, Kenneth A. (Technostructure Corp., Syracuse, N.Y.), and David L. Wilemon (School of Management, Syracuse University , Syracuse, N.Y.)
Research Management 15, No. 6, 14-27 (Nov. 1972) (Industrial Research Institute, 100 Park Ave., New York, NY 10017)

In this article, the nature, characteristics, and activities of venture management groups are reviewed. Venture management groups have been proposed as one approach to make companies more responsive to challenges of their operating environments. The idea behind venture management is to provide groups of people freedom and flexibility in the development and the design of new businesses. The specific objective of this study was to provide an insight into the venture management concept by reporting the results of a study that covered the following related areas: (1) the nature of venture management teams, (2) the characteristics of venture managers, (3) the organizational importance assigned to venture management, (4) management of the venture team, (5) intraorganizational contributions of other company operating units, and (6) organizational acceptance and opposition to the venture management concept. The study involved 24 large consumer and industrial goods companies. The principal method for gathering the data was by use of a detailed 10-page questionnaire. This report should help one to evaluate the feasibility and benefits of the venture management approach to new product research and development.
[6 tables, 5 references] FTP

9.3 THE LEGAL STATUS OF THE CONTINENTAL SHELF OF THE EAST CHINA SEA

Allen, Donald R. (District of the Columbia Bar), and Patrick H. Mitchell (California and District of Columbia Bars)
Oregon Law Review 51, No. 4, Part II, 789-812 (Summer 1972)

Recent reports that the continental shelf of the East China Sea may contain large oil deposits accounts for the present interest of countries bordering on that sea to the extent of their sovereignty over that shelf. Apparently, international law does not provide an easy solution to delimitation of the boundary on the continental shelf of the East China Sea; in fact, it can be used to support competing positions. In this article, the authors identify the continental shelf boundary problems of each of the interested states, examine the legal basis for their claims, and analyze the competing claims to determine a reasonable range of solutions under international law.

Having outlined the legal considerations from which a delimitation of continental shelf boundaries might be made in the East China Sea, the authors discussed three distinct alternative methods of delimitations that could be considered as a basis for furthering agreement among the parties. These are: (1) Equity. The equitable delimitation is based on special circumstances and involves certain factors in reaching a decision such as general configuration of the coasts of the parties; the physical and geological structure, and natural resources of the area; and the element of a reasonable degree of proportionality. Although the

(over)

9.3 THE 1971 UNITED STATES PROPOSALS ON THE BREADTH OF THE TERRITORIAL SEA AND PASSAGE THROUGH INTERNATIONAL STRAITS

Knight, H. Gary (Marine Resources Law, Louisiana State University)
Oregon Law Review 51, No. 4, Part II, 759-787 (Summer 1972) (School of Law, University of Oregon, Eugene, OR 97403)

On August 13, 1970, the United States Government presented a working paper at the meeting of the United Nations Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction (Seabed Committee). This working paper concerned a regime to govern exploration for and exploitation of the nonliving resources of the seabed beyond limits of national jurisdiction. It was part of a larger package of law-of-the-sea proposals that the United States ultimately would place before the international community in connection with the forthcoming Third United Nations Conference on the Law of the Sea. Additional proposals submitted in 1971 consisted of three articles: Article I establishes a maximum limitation of 12 nautical miles on the breadth of the territorial sea; Article II provides for free transit through and over international straits; and Article III provides the basis for a high seas fishery management program, including a system of preferential fishing rights for coastal states. In the present paper, the author identifies and describes Articles I and II of the new proposals and makes some preliminary comments on their elements.

In his conclusion, the author states that important issues are at stake in the current law-of-the-sea negotiations, and that it is crucial that an essentially international regime governing activities in ocean space be evolved so that the weaknesses of the nation-state system do not spread into the ocean arena. Emphasis should be on cooperation, and the regimes should be developed on the basis of their own substance, without compromise because of real or imagined defense needs. [102 footnotes] FTP

9.3 (9.19)

Standing alone, this convention will not solve the problems of marine pollution. But when the dumping convention is considered with other conventions adopted through the Intergovernmental Maritime Consultative Organization (IMCO), especially those dealing with oil pollution, a genuinely workable framework of controlling marine pollution is emerging.

...we are building a momentum on international steps to control pollution. The nations of the world must maintain it. International cooperation to protect the environment provides a positive and vital opportunity for the nations of the world to work together. The United States will continue to lend its full support to these efforts. Reprinted in part

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9.6 FISHERY PUBLICATIONS, CALENDAR YEAR 1971: LISTS AND INDEXES

Manar, Thomas A. (Scientific Publications Staff, National Marine Fisheries Service, NOAA, Seattle, WA 98115)
NOAA Technical Report NMFS CIRC-372, iv + 24 pp. (Oct. 1972) For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price 30 cents.

Fishery Publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, in calendar year 1971 are listed numerically (with abstracts) and indexed by author, subject, and geographic area. The following series are included: NOAA Technical Report CIRC (formerly Circular); Data Report; Fishery Leaflet; and NOAA Technical Report NMFS SSRF (formerly Special Scientific Report--Fisheries). FTP

9.2 PROSPECTS OF PETROPROTEIN (0.8)(0.6)

Masuda, Yoshiro (Biological Chemistry Section, Central Research Laboratory, Mitsubishi Petrochemical Co., Ltd.)
Chemical Economy & Engineering Review 4, No. 10, 22-28, 36 (Oct. 1972) (Chemical Economy Research Institute, Shikoku Bank Bldg., 13-7, 1-chome, Uchi-Kanda, Chiyoda-ku, Tokyo, 101 Japan)

This article is a brief review of the methods of production, the composition, the uses, and the problems associated with the production of petroprotein. Data are given on the proximate composition, and amino acid and vitamin content of three Japanese-produced petroproteins. Data on proximate composition are presented in the table that follows.

Item	Composition of the petroproteins in wt %		
	Product 1	Product 2	Product 3
Moisture	5.8	4.4	5.2
Crude protein	61.8	56.5	53.1
Crude protein (dry basis)	65.6	59.1	56.1
Crude fat	4.9	1.4	7.8
Crude fiber	5.7	4.2	6.5
Crude ash	5.6	7.7	5.7
Nitrogen-free extract	16.2	25.8	21.7

6 figures, 3 tables, 6 references] FTP

9.3

principle of equitable delimitation of overlapping continental shelf boundary areas is the oldest and probably most widely used method, it is the most imprecise. However, delimitation by equitable principles may best accommodate some of the unusual geographic features of the East China Sea area. (2) Equidistance. The equidistant principle involves the establishment of fixed base points from which an equidistant boundary line is then constructed. (3) Other Mathematical Formulas. These include formulas weighted for length of coastline, total size of national territory, size of population, or even height of mountains. Although international law offers no absolute solutions to problems of determining boundaries of the continental shelf, it does present possible approaches that could be used to reach an agreement. [85 footnotes] FTP

9.7 HOW TO PREDICT CREATIVITY FROM BIOGRAPHICAL DATA

Whiting, Bruce G. (Dept. of the Army)
Research Management 15, No. 6, 28-34 (Nov. 1972)

The author believes that the link between biographical data and scientific creativity has been firmly established and that use of the method he describes here will raise the probability of hiring creative R&D workers.

[1 figure, 2 tables, 8 references] FTP

2.3 SEAFOOD SORTER

Harper, Foye H. (P.O. Box 352, Newberg, OR 97132) (pat.)
U.S. Patent 3,696,925 (Oct. 10, 1972)

This sorter separates wet, sticky chunks of seafood from a pile of such chunks. FTP

9.6 CHITIN AND CHITIN DERIVATIVES.
AN ANNOTATED BIBLIOGRAPHY OF SELECTED PUBLICATIONS
FROM 1965 THROUGH 1971

Pariser, E. R., and S. Bock (compilers)
Report No. MITSG 73-2, 199 pp. (Oct. 15, 1972) (Sea Grant Project Office, Massachusetts Institute of Technology, Cambridge, MA 02139)

In a report from other work an estimate is given that chitin is the second most important natural polysaccharide on earth and is more abundant than cellulose. Insects, crustacea, copepods, and many other invertebrates synthesize, or use chitin synthesized by other forms, for structural support and protection from the environment. As a result of serious pollution problems caused by annual dumping of thousands of tons of waste from lobster, shrimp, and crab packing plants which is highly resistant to biodegradation, a systematic, in depth study of chitin was required. The existing body of knowledge on the distribution, properties, and uses of chitin was widely scattered. This information was concentrated into a bibliography which has a few references that are dated 1962, 1963, and 1964. Most of the cited literature was published in the years 1965 through 1971.

The subject matter is divided into eight sections: distribution and localization of chitin and its derivatives in extant plants and animals, and in fossils; properties of chitin and its derivatives; interactions of chitin and related compounds with other molecules; chitin metabolism; chitinases and related enzymes; chitin and its derivatives as industrial raw materials; preparation and purification of chitin and its derivatives; and foreign and United States patents.

Each article is abstracted. There is a subject and an author index. SW

6.6 (0.4) POTENTIAL BIOMEDICAL SUBSTANCES IN THE EXTRACTS OF MARINE ORGANISMS

Yasumoto, Takeshi (Fac. Agric., Tohoku Univ., Sendai, Japan)
Chemical Abstracts 76. No. 17, 95551m (Apr. 24, 1972)

9.7 (1.0115) NEW ENGLAND & THE SEA.
A GUIDE FOR STUDENTS AND TEACHERS

Shafer, Thayer (editor) (Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882)
University of Rhode Island Marine Bulletin, No. 11, 58 pp. (1972). Price $1.00. Available from the Marine Advisory Service, University of Rhode Island, Naragansett Bay Campus, Naragansett, RI 02882)

This guide [work book] is intended to accompany the showing of the television, series "New England and the Sea" produced in 1972 for 4-H audiences in Rhode Island and Massachusetts. Although the setting for the series was New England, the author indicates that the material can be used in any study of marine topics. Some of the topics discussed include oceanography; evolution of the New England coast; tide pools and the rocky intertidal zone; beach, dune, and marsh; sounds of the sea; marine food chain; commercial fishing; boats; navigation; pollution, coastal zone uses; and marine careers. Each section contains references to pertinent books and films. FTP

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

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0.322 (1.89) SPAWNING INHIBITOR IN GONADS OF THE STARFISH, ASTERINA PECTINIFERA

Ikegami, Susumu, and Saburo Tamura (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 11, 1899-1902 (Nov. 1972)

The gonad of the starfish is induced to shed mature gemetes (reproductive cells--eggs) by the gonad stimulating substance (GSS) 1-methyladenine secreted by nerve tissue. The gonad, however, fails to react to the GSS at the earlier stage of the breeding season and becomes more sensitive to it toward the end of the season. The agent that controls spawning by inhibiting nerve tissue secretions was found to be L-glutamic acid.

Samples of separated ovaries and testes were homogenized in sea water, and the active agent was purified by centrifugation, extraction with sodium chloride, gel filtration, and chromatography techniques. The purified extract thus obtained was identified as L-glutamic acid by thin-layer and paper chromatography, paper electrophoresis, and amino-acid analysis. Other experiments showed that this spawning inhibitor contained in ovary extract was similar or identical to that extracted from testes.

Authentic L-glutamic acid had the same spawning inhibiting effect on nerve tissue as the purified extract. Other amino acids tested had no such activity except L-aspartic acid which was much less active (less than 10% of L-glutamic acid). [4 figures, 1 table, 9 references] SW

0.322 (1.89) ISOLATION AND CHARACTERIZATION OF SPAWNING INHIBITORS IN OVARY OF THE STARFISH, ASTERIAS AMURENSIS

Ikegami, Susumu, Yuji Kamiya, and Saburo Tamura (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 11, 2005-2011 (Nov. 1972)

In another report in the same journal number, the authors isolated and identified the inhibitor of spawning in another starfish, Asterina pectinifera, to be L-glutamic acid. This acid, however, is specific to A. pectinifera, having no inhibitory effect on the spawning of A. amurensis.

To isolate and identify the spawning inhibitor of this starfish the ovaries were homogenized in sea water and centrifuged at 30,000×g at 2° C. for 50 min. The supernatant was diluted with sea water containing nerve tissue. Into each solution was placed a fragment of ovary removed from the starfish at the peak of the breeding season; and the degree of spawning was observed.

The effect of the homogenized, centrifuged ovary isolate was to counteract the activity of the gonad-stimulating substance (GSS) contained in the nerve tisuse. Starfish testes prepared similarly also inhibited GSS.

The isolate was purified by extraction, gel filtration, and silica-gel column chromatography. Two fractions were detected and isolated. Assay of both for activity as inhibitors against 10 µg. of nerve tissue Fraction A showed inhibition of GSS at 12.5 to 125 µg. per milliliter and Fraction B 63 to 125 µg. per ml. Both fractions caused hemolysis and easily foamed in water. Spectrophotometric and chromatography analysis of Fraction A after hydrolysis showed characteristics of

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0.35 (9.12) THE FREEZING RESISTANCE OF ANTARCTIC FISH: I. SERUM COMPOSITIO AND ITS RELATION TO FREEZING RESISTANCE

Smith, R. N.
British Antarctic Survey Bulletin, No. 28, 1-10 (June 1972) (British Antarctic Survey, Natural Environment Research Council, 30 Gillingham St., London SW1 1HY, England) Price £1.50 net.

In polar regions, the blood of teleost fish may be supercooled for all or part of the year, and while supercooled, the fish may be in danger of freezing if the freezing is initiated ("seeded") by contact with ice. These fish, in order to survive, must either avoid contact with ice or must be able to resist formation of ice in their bodies if contact with ice does occur. Deep-water species of Arctic fish avoid contact with ice and the shallow-water Arctic species possess a marked freezing resistance. In the present study, the serum from nine species of Antarctic fish was analyzed to determine which components, if any, ai their survival in the polar region; the serum from two subtropical fish was examined for comparative purposes. The polar species were caught off Signy Island Borge Bay and South Georgia, King Edward Point and Prince Olav Harbor and consisted of the following species Notothenia neglecta Nybelin, N. rossii marmorata Fischer, N. gibberifrons Lönnberg, Chaenocephalus aceratus (Lönnberg), Parachaenichthys charcoti (Vaillant), Trematomus bernacchii Boulenger, and T. newnesi Boulenger, and Muraenolepsis microps Lönnberg. The subtropical species were caught off Montevideo and consisted of Micropogon furnieri (Desmarest) and Netuma barbus (Lacépede). Blood samples were obtained from the heart of the fish. The serum

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0.35 (9.12) THE FREEZING RESISTANCE OF ANTARCTIC FISH: II. THE FREEZING POINTS OF BODY FLUIDS

Smith, R. N.
British Antarctic Survey Bulletin, No. 29, 91-102 (Aug. 1972) (British Antarctic Survey, Natural Environment Research Council, 30 Gillingham St., London SW1V 1HY, England) Price £1.50.

The freezing points of the body fluid of polar fish (in conjunction with bod temperatures) indicate whether or not the fish are supercooled when they encounte low sea temperatures. Freezing-point measurements along with chemical analyses data reveal the response of the polar fish to change of temperature (whether changes in salt concentration occur or whether specific "antifreeze" substances are released in the body fluids). The present paper, reports the freezing points of the body fluids of nine teleosts from the Antarctic. The first part of the article consists of a critical review of methods for measuring freezing points with especial reference to their application to biological fluids. A modified version of the J. A. Ramsay and R. H. J. Brown [J. Scient. Instrum. 32, No. 10, 372-375 (1955)] freezing point method was used. By this method, freezing points of small samples (4×10^{-2} mm^3.) can be measured to ±0.02° C. The fish were caught off Signy Island in the South Orkney Islands and at South Georgia. The freezing points of the serum, aqueous humor, urine, cerebrospinal fluid, bile, and tissue fluid were measured.

The freezing points of the various fluids of the nine Antarctic teleosts were between -0.65° C. and -1.34° C. There were no marked differences between the

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0.322 (1.89)

asterosaponin A, previously reported from the same starfish. Fraction B was similarly analyzed and found to be asterosaponin B. Biological activity of these fractions compared to authentic asterosaponins and was found to be identical.
[5 figures, 17 references] SW

Ueno, Kisaburo, Saburo Adachi, Toyoasu Koda, and Tamotsu Mínami (Mitsui Toatsu Chemicals Co., Ltd.) (pat.)
Japanese Patent 21997/72 (June 20, 1972)
Chemical Abstracts 77, No. 13, 86664u (Sept. 25, 1972)

0.35 ISOLATION OF RIBONUCLEIC ACID

0.35 (9.12)

freezing points of the various body fluids in the same fish. The measured freezing points agreed reasonably well with the calculated values. The aqueous humor and urine were, on the average, hypoosmotic to serum for all fish, but the bile (of all species except Notothenia neglecta), cerebrospinal fluid, and tissue fluid were hyperosmotic to serum. The author concludes from the results that the polar fish are supercooled at low environmental temperatures.
[1 figure, 3 tables, 68 references] FTP

Starfish contain toxic saponins (glucosides). Earlier, T. Yasumoto, T. Watanabe, and Y. Hashimoto [Bull. Jap. Soc. Sci. Fisheries 30, 357 (1964)] isolated six saponins from the starfish Asterias amurensis, naming the two major ones asterosaponins A and B. In the present study, the authors subjected asterosaponins A and B to acid hydrolysis, and isolated a new steroid, which was the main component of the hydrolyzed mixture. The new steroid was named asterosapogenine I and was assigned the structure 3β,6α-dihydroxy-5α-pregn-9(11)-en-20-one.
[5 figures, 1 table, 9 references] FTP

0.35 (8.59) ISOLATION AND STRUCTURE OF A NEW STEROID, ASTEROSAPOGENINE I, FROM ASTEROSAPONINS A AND B

Ikegami, Susumu, Yuji Kamiya, and Saburo Tamura (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 10, 1777-1782 (Oct. 1972)

0.35 (0.4) PANCREATECTOMY IN THE EEL: EFFECTS ON SERUM GLUCOSE AND CHOLESTEROL

Lewis, Thomas L., and August Epple (Daniel Baugh Institute of Anatomy, Jefferson Medical College of Thomas Jefferson University, Philadelphia, PA 19107)
Science 178, No. 4067, 1286-1288 (Dec. 22, 1972)

Little is understood about the physiological role of the endrocrine pancreas in fishes; furthermore, the few data on pancreatectomy or isletectomy in teleosts are in part contradictory. The American eel is the only teleost known to have all islet tissue concentrated in a compact pancreas. The researchers examined the effects of pancreatectomy of the American eel on (1) serum glucose, as an indicator of diabetic alterations; and (2) serum cholesterol, because of its high levels in some teleosts (particularly the eel).

Pancreatectomy in the American eel caused a slight tendency toward hypoglycemia. Total and partial pancreatectomies caused a drop of total serum cholesterol. The total serum cholesterol of the eel is comprised of two fractions, one of which is pancrease dependent (this fraction amounts to about 70 to 80%). The complete removal of the islet tissue in the eel, thus, is not followed by diabetes mellitus; furthermore, the endocrine control of the cholesterol-containing serum seems to differ from that in mammals.
[2 figures, 42 references] FTP

0.35 (9.12)

was separated from the clotted blood and was stored deep frozen until analyzed. The freezing points of the serum were determined. Chemical analyses for sodium, potassium, protein, total carbohydrate, and reducing sugar were made.

The serum from the Antarctic fish was a more concentrated solution than was the serum from the temperate fish. Unusually high levels of serum reducing sugar occurred in most of the Antarctic species.

Two of the Antarctic species of fish were caught in the summer and in the winter. The concentration of most serum constituents was higher in the winter-caught fish than in the summer-caught fish; however, the higher level of constituents was not sufficient to lower the serum freezing point to that of sea water. It appears that inorganic serum constituents do not contribute significantly to the freezing resistance of supercooled fish in contact with ice. Serum reducing sugar and possibly protein and glycoprotein appear to protect the blood from freezing, probably by preventing or retarding the nucleation and propagation of ice in the blood. When a comparison was made of the serum composition and freezing resistance of several species, it was apparent that knowledge of serum composition alone was insufficient to predict the survival time of a supercooled fish in contact with ice; however, the comparison was sufficient to predict whether or not the blood of the fish was liable to freeze in these circumstances.
[8 tables, 52 references] F

0.35 DIFFERENCES IN TRIACYLGLYCEROLS FROM ACOUSTIC TISSUES AND POSTERIOR CRANIAL BLUBBER OF THE NARWHAL (MONODON MONOCEROS)

Robisch, Paul A., Donald C. Malins (Pioneer Research Unit, Northwest Fisheries Center, Seattle, WA 98102), Robin Best (Dept. of Zoology, University of British Columbia, Vancouver, British Columbia, Canada), and Usha Varanasi
Biochemical Journal 130, No. 1, 33P-34P (Nov. 1972)

This article summarizes a paper presented at the 529th Meeting of the Biochemical Society held at the University of Cambridge, England, on July 4-5, 1972.

The acoustic tissues of porpoises (Phocoena phocoena and Tursiops gilli) and the Beluga whale (Delphinapterus leucas) contain large amounts of isovalerate (3-methylbutyrate) and long-chain saturated iso acids. The cranial blubber (which has no acoustic function) of T. gilli contains primarily acids characteristic of normal mammalian adipose tissues. The large amounts of di-isovaleroyl glycerides in the acoustic tissues of T. gilli appear to play a vital role in sound transmission. In the present study, analyses were performed on the triacylglycerols from the acoustic tissues at the attachment point of the mandibular waveguide to the bulla in the Arctic narwhal (Monodon monoceros). For comparative purposes, analysis was also made of the triacylglycerols from the nonacoustic posterior cranial blubber.

The acoustic tissues and the blubber contained 94.5% of lipid, consisting of 82.2% and 85.5% of triacylglycerols, respectively. The triacylglycerols from the acoustic tissues contained 47.8 mol of isovalerate per 100 mol and 18.7 mol of long-chain iso acids (primarily isopentadecanoate) per 100 mol. Straight-chain monounsaturated acids ($C_{16:1}$; $C_{18:1}$) were found in significant amounts, and some

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0.38 CATHEPTIC ACTIVITY OF FISH MUSCLE

Reddi, Penchala K., Spiros M. Constantinides, and Henry A. Dymsza (Dept. of Food and Nutritional Science, University of Rhode Island, Kingston, RI 02881)
Journal of Food Science 37, No. 5, 643-648 (Sept.-Oct. 1972)

Fish muscle cathepsins have not been studied in great detail, although some work has been done on the purification and activity of these cathepsins. [Cathepsins are enzymes in living cells that have a hydrolytic action in living or dead animal tissues.]

In the present study, the authors examined the intracellular localization of catheptic activity in the skeletal muscle of winter flounder and determined some of the physical and chemical properties of the enzyme in its relation to autolytic spoilage.

The catheptic activity was localized in the lysosomal fraction of the skeletal muscle of the fish. The muscle cathepsin acted on urea-denatured hemoglobin, native hemoglobin, globin, bovine serum albumin, and on certain cytoplasmic proteins (endogenous). The optimum hemoglobin splitting activity of the enzyme was at pH 4.0. The enzyme is thermostable, dialysis has no effect on its activity, and it is inhibited by sodium chloride, cysteine, ATP, NAD, and pheynl methyl sulfonyl fluoride. The molecular weight of the enzyme is about 32,000.
[7 figures, 4 tables, 34 references] FTP

0.35 BINDING TO MITOCHONDRIAL PROTEINS OF LECITHINS CONTAINING KNOWN FATTY ACIDS

Collins, F. D., G. G. De Pury, Maria Havlicek, and Chor-Sang Lim (Russell Grimwade School of Biochemistry, University of Melbourne, Parkville, Victoria 3052, Australia)
Chemistry and Physics of Lipids 7, No. 3, 144-158 (Nov. 1971)

Mitochondria, freed of lipids by aqueous acetone extraction, rebind lecithin in a two-step reaction in which the second step is rate limiting. This binding occurs faster in lecithins from rats deficient in essential fatty acids than in lecithins from normal rats. In lecithins of rats deficient in essential fatty acids, the linoleic and arachidonic acids of the lecithins of the normal rats are replaced by palmitic, oleic, and 5,8,11-eicosatrienoic acids. This paper reports on the mechanism and relative importance of these changes in fatty acid composition in influencing the rate of binding of lecithin to mitochondrial protein.

The lecithins from the livers of normal rats and from rats deficient in essential fatty acids were separated into fractions containing mainly 1,2,3, or 4 double bonds. These fractions were then dispersed in aqueous buffer (10 mM tris chloride, pH 7.6) by ultrasonic irradiation. The rates of binding of the lecithin dispersions to mitochondria (whose lipids had been extracted with aqueous acetone) were measured.

The kinetics of the reaction involved initially a Brownian coagulation between lecithin and protein particles followed by a rate-limiting interaction of lecithin molecules with mitochondrial protein. The authors derived a rate equation

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0.4 (0.6) CONTRIBUTIONS OF THE BIOLOGICAL SCIENCES TO HUMAN WELFARE

[various authors as listed below]
Federation Proceedings 31, No. 6, Part II, TF5-TF144 (Nov.-Dec. 1972)

Reviews are made of the contributions of biological research to the betterment of human welfare. The subjects and areas considered are:

"Introduction," by Edwin H. Lennette and J. F. A. McManus, pp. 13-17;
"Basic Biomedicine," by James W. Colbert, Jr., pp. 19-32 [4 tables, 11 references];
"Clinical Medicine," by George E. Burch, pp. 33-70 [14 figures, 1 table, 55 references];
"Dental Science," by Joseph F. Volker, pp. 71-79 [2 figures, 23 references];
"Food," by Emil M. Mrak, pp. 81-90 [16 references];
"Population Biology," by Frederik B. Bang, pp. 91-100 [23 references];
"Environmental Hazards," by John J. Hanlon, pp. 101-120 [4 tables, 65 references];
"Marine Sciences," by Clarence P. Idyll, pp. 121-130 [7 references]; and
"Natural Resources," by Frederick Sargent II, pp. 131-139 [7 references].

FTP

0.35

for these two steps that contained three parameters representing, respectively, the rate constant for the coagulation step, the surface area of the mitochondria, and the rate constant of the second step. Lecithins containing arachidonic acid (that is, the lecithins from livers of normal rats) interacted significantly more slowly than those containing 5,8,11-eicosatrienoic acid or mixtures of oleic and linoleic acids. The slow binding of arachidonyl lecithins suggests that these species are bound to mitochondrial membrane protein more strongly than are 5,8,11-eicosatrienoyl or oleyl lecithins. Apparently an important role of the essential fatty acids is to stabilize lipoprotein membranes; in a deficiency of the essential fatty acids, linoleic and arachidonic acids are replaced by oleic and 5,8,11-eicosatrienoic acids with a resulting weakening of phospholipid protein bonds. [3 figures, 7 tables, 22 references] FTP

0.5 NITROSAMINES AND THE INHIBITION OF CLOSTRIDIA IN MEDIUM HEATED WITH SODIUM NITRITE

Wasserman, Aaron E., and Charles N. Huhtanen (U.S. Dept. of Agriculture, Eastern Regional Research Laboratory, Eastern Marketing and Nutrition Research Div., ARS, Philadelphia, PA 19118)
Journal of Food Science 37, No. 5, 785-786 (Sept.-Oct. 1972)

Earlier (1967 and 1968) work demonstrated the formation of an inhibitor for the growth of several species of Clostridium during the heat sterilization of a culture medium containing $NaNO_2$. It appeared that the nitrite reacted with a component of the medium and that the inhibitory material was something other than nitrite. The nature of the inhibitory component is not known. In the present study, the researchers attempted to determine whether nitrosamines were responsible for the inhibition of the clostridia. The culture medium was prepared in two ways. In the first method, the $NaNO_2$ was added to the medium and the medium was autoclaved. In the second method, the medium and the NO_2^- solution were autoclaved separately, then mixed aseptically. Sodium nitrite was used in the media at levels ranging from 640 to 1.25 p.p.m. The test organism was C. botulinum B1218 (USDA culture).

In the medium autoclaved with the NO_2^-, the minimum inhibitory level of NO_2^- was 40 p.p.m.; in the medium to which NO_2^- was added aseptically, the minimum inhibitory level of NO_2^- was 640 p.p.m. Analysis of the medium prepared with 640 p.p.m. of sodium nitrite revealed no nitrosamines. Additional experiments were carried out using the nitrosamines N-nitrosodimethylamine, N-nitrosodiethylamine, N-nitrosoproline, N-nitrosomorpholine, N-methyl-N-nitrosoethylamine, N-nitrosodiethanolamine, 1-nitrosopiperidine, N-nitrosodiphenylamine, N-methyl-N-nitrosoaniline, and N-nitrosomethylurea. None of these nitrosamines inhibited the growth of C. botulinum, even up to levels of 1,000 p.p.m. [1 figure, 6 references] FTP

0.35

polyunsaturated acids ($C_{16:2}$; $C_{16:3}$) were detected. The triacylglycerols from the blubber had 4.2 mol of isovalerate per 100 mol and 0.9 mol of long-chain iso acids per 100 mol, with large amounts of straight-chain monounsaturated acids ($C_{14:1}$; $C_{16:1}$; $C_{18:1}$; $C_{20:1}$; $C_{22:1}$) and polyunsaturated acids ($C_{18:2}$; $C_{20:5}$; $C_{22:5}$; $C_{22:6}$). Sixty-six percent of the structures of the triacylglycerols from the acoustic tissues consisted of 2 mol of isovalerate and 1 mol of long-chain acid per mol. The blubber did not contain di-isovaleroyl glycerides. The present findings strengthen the hypothesis that di-isovaleroyl glycerides are involved in the biosonar of marine cetaceans. Also, the lipid structural requirements for acoustic tissues appear to be similar for marine cetaceans from warm and from cold waters. [5 references] FTP

0.38 (3.15) THE EFFECT OF GAMMA IRRADIATION ON THE ANTITHIAMINE ACTIVITY OF SKIPJACK TUNA

Hilker, Doris M., Nora Yu-Ang Tang, and King-Cham Chan (Dept. of Food and Nutritional Sciences, University of Hawaii, Honolulu, HA 96822)
Journal of Food Science 37, No. 4, 596-598 (July-Aug. 1972)

Earlier work at the authors' laboratory demonstrated that skipjack tuna contain antithiamine activity which is nonenzymatic. The activity resides in a protein-nonprotein complex, with the nonprotein moiety being responsible for the anti thiamine activity. Other workers isolated a thermostable antithiamine factor (a hemin or a related compound) from carp viscera. Heme proteins, including hemoglobin and catalase, show antithiamine activity. Recent reports indicate that irradiation reduces or destroys "thiaminase" (antithiamine) activity in alewife and clam. The purpose of the present study was to determine the effect of gamma irradiation on the antithiamine activity of skipjack tuna and protein fractions of the water-soluble extracts of the fish muscle. The flesh samples were prepared under air and under N_2 atmosphere. Irradiation was at 1, 2, 3, or 4 Mrad dose levels.

The antithiamine activity (μg. of thiamine destroyed per mg. dry weight) of the water-soluble fish extracts irradiated in air increased at a dosage of 4 Mrad but activity of that irradiated under N_2 atmosphere decreased. Irradiation had no effect on the antithiamine activity of heme protein fractions of the fish extr separated by $(NH_4)_2SO_4$ precipitation. The water extractable solids from fresh fi irradiated at 4 Mrad in air decreased but those irradiated under N_2 atmosphere did not. The authors believe that the principal effects of irradiation on the antithiamine activity of tuna fish protein involve denaturation of the antithiamine activity to inactive protein. [2 figures, 2 tables, 11 references] FTP

0.35 PRODUCING COLLAGENASE BY CULTURING A VIBRIO SPECIES (0.5)

Merkel, Joseph R. (Lehigh University) (pat.)
U.S. Patent 3,677,900 (July 18, 1972)
Chemical Abstracts 77, No. 13, 86663t (Sept. 25, 1972)

0.6 (0.7) EFFECTS OF PROCESSING, STORAGE, AND HANDLING ON NUTRIENT RETENTION IN FOODS

[various authors listed below]
Food Technology 27, No. 1, 16 ff. (Jan. 1973)

Summaries are presented of four papers given at a Symposium on the subject during the 32d Annual Meeting of the Institute of Food Technologists, Minneapolis, Minn., May 21-25, 1972. The papers are as follows:
"Effects of Heat Processing," by D. B. Lund (Dept. of Food Science, University of Wisconsin, Madison, WI 53706), pp. 16, 18.

The desirable effects of heat processing include favorable alteration of the characteristics of the product (browning, improved texture, increased palatability); destruction of microrganisms; destruction of enzymes (peroxidase, thiaminase, ascorbic acid oxidase); improvement in availability of nutrients (gelatinization of starches, increased digestibility of proteins); and destruction of undesirable components (avidin in egg white, trypsin inhibitor in legumes). The undesirable effects of heat processing include adverse changes in protein, amino acids, carbohydrates, and lipids, and losses in vitamins and minerals. [23 references]
"Effects of Dehydration and Storage," by T. B. Labuza, pp. 20-21, 23,25-26, 51.

Dehydration of foods involves many different types of processes, the choice of which depends upon quality and economic considerations. Effects of drying and storage include direct loss of nutrients, and reduction of biological availability of nutrients resulting from their interactions. [81 references]

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0.7 SILICON: AN ESSENTIAL ELEMENT FOR THE CHICK

Carlisle, Edith M. (Environmental and Nutritional Sciences, School of Public Health, University of California, Los Angeles, CA 90024)
Science 178, No. 4061, 619-621 (Nov. 10, 1972)

Silicon, next to oxygen, is the most abundant element in the earth's crust; trace amounts of silicon appear in most animal tissues. Previous studies by the author had shown silicon to be localized in active calcification sites in young bone. She has suggested that silicon is associated with calcium in an early stag of bone formation.

Other workers have suggested a possible physiological function of silicon. But no studies have shown the essentiality of the element. Studies were conducte to determine the essentiality of silicon.

Because of the ubiquitous nature of silicon extra efforts were made to exclude it from diets and equipment necessary in the study. White leghorn chicks were selected for the experiments. Three groups of eight chicks were fed the basal diet (low in silicon), and three similar groups were fed the basal diet plus silicon supplement. The silicon was supplied as sodium metasilicate, $Na_2SiO_3 \cdot 9H_2O$ at a level of 100 parts of silicon per million in the diet. The chicks were evaluated at 2- to 3-day intervals and killed at the end of a 25- to 35-day perio

Silicon was found to increase the growth of chicks in comparison to growth of chicks based on the unsuppelemented diet. The chicks on the unsupplemented basal diet appeared to be stunted; subsequent examination of all organs indicated that they were relatively atrophied. These chicks had no wattles, and the comb

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0.6 (8.)(3.2340) (3.331) CHUB MACKEREL OF THAILAND (RASTRELLIGER NEGLECTUS, VAN KAMPEN): A SHORT STUDY OF ITS CHEMICAL COMPOSITION, COLD STORAGE AND CANNING PROPERTIES

Keay, J. N., P. Rattagool, and R. Hardy (Torry Research Station, Ministry of Agriculture, Fisheries and Food, Aberdeen AB9 8DG, Scotland)
Journal of the Science of Food and Agriculture 23, No. 11, 1359-1368 (Nov. 1972)

The proximate composition, amino-acid content, and fatty acid composition were determined on the chub mackerel of Thailand. Some samples were held in frozen storage to determine their frozen keeping quality. Additional samples were smoked and canned to determine their commercial acceptability.

The proximate composition was: water, 72.0%; crude protein, 20.7%; lipid, 6.5%; and ash, 1.7%. The protein contained the following amino acids expressed as grams of amino acid per 100 grams of protein: aspartic acid, 10.17; threonine, 4.41; serine, 4.47; glutamic acid, 15.46; proline, 3.30; glycine, 4.20; alanine, 6.23; cystine/2, 2.44; valine, 5.64; methionine, 3.73; isoleucine, 5.29; leucine, 8.93; tyrosine, 3.69; phenylalanine, 5.79; histidine, 3.16; lysine, 9.27; and arginine, 6.29.

The results of determination of the chemical indices of deterioration and taste-panel assessments of the frozen-stored fish are described.

The best canned products were obtained from fillets smoked for 45 min. and whole fish smoked for 90 min. in a mechanical kiln, and both canned in maize oil. [2 figures, 6 tables, 21 references] FTP

0.7 NUTRITION LABELING

Anonymous
Nutrition Reviews 30, No. 11, 247-252 (Nov. 1972)

On March 30, 1972 the Federal Register (37F.R. 6493) announced the Food and Drug Administration's proposed regulation on nutrition labeling. In July, under the auspices of the Food and Nutrition Board of the National Academy of Sciences, a small ad hoc group, composed of members of the Board, representatives of the food industry, and several governmental agencies, as well as others with competence in the area of food, nutrition, and/or consumer affairs, was assembled to discuss the proposed regulation. No formal report was prepared, but the Chairman of the group submitted a report to the Commissioner of the Food and Drug Administration which represented the sense of the meeting.

"The Commissioner has concluded, on the basis of the information available at the present time, that nutrition labeling should be based on the following general criteria:

1. Vitamins and minerals should be expressed as a proportion of the Recommended Daily Allowances (RDA) modified to provide a single RDA level for all ages and sexes.
2. The labeling should indicate the caloric content and the amounts of protein, carbohydrate, and fat in the product.
3. The nutrition content should be related to a portion or serving of the food expressed in common household terms or in easily identified units.

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DIETARY PROTEIN QUALITY MEASURED BY IN VITRO PROTEIN SYNTHESIS IN RAT SKELETAL MUSCLE RIBOSOMES

Von Der Decken, Alexandra, and P. T. Omstedt (Wenner-Gren Institute, Stockholm, Sweden)

Journal of Nutrition 102, No. 12, 1555-1562 (Dec. 1972)

For 6 consecutive days rats were fed a diet containing either 10% or 20% protein of varying biological values. Ribosomes of skeletal muscle were isloated. The RNA content per gram wet weight of muscle was higher in the ribosomal preparations of the casein-fed than of the wheat gluten-fed rats. This RNA was shown by polyacrylamide gel electrophoresis to be of ribosomal origin. The proteins present in the ribosomal preparations seemed unchanged when expressed per unit wet weight of muscle. The small alterations in protein due to changes in ribosomal content could not be detected by the analytical methods used. The amino acid-incorporating activity of the skeletal muscle ribosomes was measured. When diets containing 10% protein were fed the isotope incorporation relative to protein was highest with casein as the protein source, followed by barley and soya protein or wheat gluten in that order. These differences correlated well with their biological value but less well with their protein efficiency ratio. Calculations of the radioactivity values relative to ribosomal RNA gave no differences in activity between the groups of rats. When diets containing 20% protein were fed the effect on protein synthesis was more pronounced and apparent also relative to ribosomal RNA. In addition, the activity of liver ribosomes per RNA--but not per protein--was higher in the casein-fed than in the wheat gluten-fed rats. The amino acid-incorporating activity of skeletal muscle ribosomes was positively correlated with the biological value of the dietary protein both at a 10% and a 20% level while the agreement with the protein efficiency ratio was less marked.
[7 tables, 25 references] Authors' abstract

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4. A complete listing of the seven important vitamins and minerals should appear on all products unless the product contains essentially none of those vitamins or minerals.
5. A listing of protein content should appear on all products unless the product contains no protein."

Reprinted in part

0.6 EFFECT OF HEAT TREATMENT ON FISH MUSCLE PHOSPHOLIPID COMPOSITION

El-Bastawizi, Mohamed A., and G. A. Suitnova (Mosk. Inst. Nar. Khoz. im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 13, 86725q (Sept. 25, 1972)

0.6 (0.7)

"Effects of Food Service Handling," by G. E. Livingston, Catharina Y. W. Ang, and Charlotte M. Chang (Food Science Associates, Inc., 145 Palisade St., Dobbs Ferry, NY 10522), pp. 28-30, 32, 34.

Thirty or more categories of the food service industry are involved in the feeding of different portions of the population. In the optimization of retention of nutrients naturally occurring in foods, three stages require particular attention: raw material handling, food preparation, and service of prepared food. [47 references]

"Effects of Reheating Convenience Foods," by Paul A. Lachance, Arvind S. Ranadive, and Jonathan Matas (Dept. of Food Science, Rutgers University, New Brunswick, NJ 08903), pp. 36-38.

In the preparation and storage of canned and frozen fruits and vegetables, vitamins and minerals are lost due to trimming, blanching, extracting, straining, and leaching. The extent of loss depends on many factors including temperature, time, packaging material, and others. Before consumption, foods are further exposed to heat, light, and oxygen and are subject to additional losses of nutrients. For most fruits and vegetables, for example, loss in vitamin content due to reheating of processed products ranges from 20 to 50%. [17 references]

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0.7

was severely attenuated. The bones of these chicks were shorter, thinner, and more flexible than those of normal chicks.

The level of silicon found to be effective for normal growth is on the order present in plant and animal foodstuffs. The discovery of the essentiality of silicon has many implications: (1) from an evolutionary point of view, silica is known to perform a skeletal role in some primitive organisms; and (2) although the toxicity and carcinogenic effects of silica and fibrous silicates have received attention, silicon as a participant in normal metabolism must now be considered. [1 figure, 1 table, 17 references]

SW

0.7
(2.8)(5.4)

EFFECT OF MICROWAVE HEATING ON VITAMIN B_6 RETENTION IN CHICKEN

Wing, R. W., and J. C. Alexander (Dept. of Nutrition, University of Guelph, Guelph, Ontario, Canada)
Journal of the American Dietetic Association 61, No. 6, 661-664 (Dec. 1972)

Microwave cooking (at a frequency of 2,450 megahertz for 1.5 min.) resulted in significantly greater retention of vitamin B_6 in the meat than did roasting by conventional oven (at 162.7° C. to an internal temperature of 88° C.). Pertinent data are shown in the tables that follow.

Sample number	Vitamin B_6 content of chicken breast in mcg./g.		
	Raw	Microwave cooked [1]	Conventionally cooked [2]
1	19.2	15.4	16.6
2	17.2	16.6	16.3
3	22.0	18.0	15.5
4	22.2	21.1	16.9
5	18.2	20.6	16.2
6	17.2	15.5	16.1
7	25.0	24.1	19.4
8	21.7	20.3	14.4
9	19.1	15.6	17.6
10	20.6	17.7	18.4

[1] Heated for 1.5 min.
[2] Heated for 45 min.

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1.0161

RESULTS OF THE UNDP(SF)/FAO REGIONAL FISHERIES SURVEY IN WEST AFRICA. REPORT NO. 1. DEEP-SCATTERING *SARDINELLA AURITA* OFF MAURITANIA

Schmidt, W. (Abidjan, Ivory Coast, Africa)
Marine Biology 16, No. 2, 91-101 (Sept. 1972)

The northwest African shelf area between Cape Bojador (lat. 26° N.) and Cape Verga (lat. 10° N.) has rich resources of small pelagic fish. *Caranx* (jacks), *Trachurus* (jack mackerel), *Sardinella* (sardine), and *Scomber* (mackerel) are the most important groups found in this area throughout the year. Local fisheries and industrial foreign fleets exploit these stocks. Trawlers and purse seiners supported by factoryships have increased through the years: the total catch for 1970 was estimated at 1.5 million metric tons.

Catches can be low when the warm water front moves very rapidly north in April and May. *S. aurita* appear and disappear rapidly and irregularly from one region to another. During this period the fleets disperse over a large area searching for fish. The fish are not detectable by acoustic equipment during this period. Observations of this phenomenon were made during cruises of the charter vessel *Thue, Jr.* of the Regional Fisheries Survey.

Seasonal upwelling with shifts of warm and cold water masses characterize the area. The fish migrate north or south with respect to the thermal front. Maximum abundance of fish was found at the interface between warm and cool water. *S. aurita* are rarely caught over the shelf in the Senegal-Mauritania region during the rapid northward shift of the warm water masses (April and May).

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1.0112
(1.0154)(1.55)

PACIFIC POLLOCK -- THE WORLD'S LARGEST FOOD FISH RESOURCE

Alverson, Dayton L. (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Seattle, WA 98102)
Fishing News International 11, No. 12, 17, 18, 21 (Dec. 1972)

Pacific pollock is a member of the family Gadidae; its habitat is the North Pacific Ocean, occurring from Japan on the west to northern California on the east. Pollock is abundant in the Sea of Japan; the continental shelf and slope off Hokkaido, Sakhalin, Kamchatka, and the Kuriles; the eastern Bering Sea; and the northern Gulf of Alaska. Growing relatively fast during its first 3 to 4 years of life, it may attain a length of more than 60 cm., and live 10 to 12 years. It reaches maturity in 3 to 4 years at lengths of 30 to 40 cm. As with many related cod species, the pollock produces, depending on size, from 100,000 to over a million eggs during the winter and spring months. Spawning occurs in near coastal waters of sluggish or gyral currents at temperatures less than 5° C.

The larvae lie in near-surface waters, while postlarval juveniles rise toward the surface at night and descend toward mid or bottom depth with the onset of daylight. The juveniles inhabit waters on the inner continental shelf.

Adult pollock are reported to be abundant in waters on the continental shelf at depths of 44 to 82 fathoms, actively feeding, in summer and early autumn. As winter approaches, they migrate to the upper continental shelf in depths of 110 to 160 fathoms. Their food consists of small crustaceans, particularly euphausiids, copepods, and amphipods.

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1.22
(1.01111)

LENGTH, AGE AND WEIGHT OF HERRING IN THE SOUTHWEST NEWFOUNDLAND WINTER FISHERY FROM 1965-66 TO 1970-71

Hodder, V. M., L. S. Parsons, C. I. Barbour, and R. Chaulk
Fisheries Research Board of Canada Technical Report No. 339, 93 pp. (1972). (Fisheries Research Board of Canada, Biological Station, St. Johns, Newfoundland, Canada)

In the winter of 1965, exploratory fishing in Newfoundland waters resulted in discovery of large concentrations of herring. These fish were found to overwinter in the fjords of the western part of the south coast. The concentrations of herring were found by other studies and tagging experiments to migrate from the Gulf of St. Lawrence beginning in October. In southwestern Newfoundland waters the seasonal catches increased from 5,000 metric tons in 1964-65 to about 140,000 metric tons in 1968-69 and 1969-70. Investigations were begun to elucidate the size, distribution, biology, and migratory behavior of the herring stocks that supported this winter purse-seine fishery. Emphasis was placed on the sampling of seiner catches and of capture information from logbooks and port interviews.

Results of the investigations showed that there has been an increase in the average size of herring since 1965. The modal size increased from 32 cm. to 35 cm. in the 1970-71 season, and the average length from 32.7 to 34.5 cm. The narrow range and the gradual increase in size implies that a narrow range of year-classes was present in the fishery.

The composition of the samples by maturity stages indicated a mixture of two spawning groups--spring and autumn, with the latter predominating. This information also indicated that the average size and age of the two spawning groups

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1.0112 (1.0154)(1.55)

Pacific pollock abundance in the eastern corner of the Bering Sea alone is estimated to be at least 1,400,000 metric tons. Japanese, United States, and U.S.S.R. scientists have speculated that pollock is one of the most abundant fish in the North Pacific. To illustrate the difference of a decade in production, landings of pollock, in 1,000 metric tons, by countries traditionally producing the majority of pollock catches, in 1961 and 1970 were as follows: Japan, 353.3--2,346.7; U.S.S.R., 97.6--697.0; and Korea, 13.7--13.4. These increases reflect expanded fishing operations with the exception of Korea. A high proportion of the Japanese catch came from home waters. They have now extended operations to the Eastern Bering Sea.

The major source of catches by fleets from the U.S.S.R. is off the west coast of Kamchatka. They also fish in the eastern Bering Sea and the Gulf of Alaska. In the Sea of Japan, adjacent to Hokkaido, pollock is caught by longline, gill nets, and bottom trawls. In the northern waters off Kamchatka and the Kuriles, bottom trawls are used. In the Bering Sea, bottom trawls by paired trawlers and Danish seines are used.

The Japanese process pollock into fish meal and minced fish meat. A small amount is sold fresh. In Korea, the fish is frozen and dried.

The major available documentation and distribution of catches in this fishery is of Japanese origin. These data are being studied to determine catch patterns. Rapid growth of the fishery, its geographic expansion, changes of fishing gear and vessels, and improvement in fishing strategy complicate what good statistics can illuminate. To attack the problem a symposium of representatives of North Pacific rim nations, with FAO sponsorship is planned in early 1973.
[2 figures, 1 table] SW

1.22

of herring have gradually increased over the past 5 to 6 years and that the fishery has been maintained through the period by an abundance of pre-1960 year-classes. In addition, recruitment has been relatively poor since the appearance of the 1958 and 1959 year-classes.
[7 figures, 65 tables, 24 references] SW

[5 figures, 1 table, 5 references] FTP

as echo integrators and echo counters.
netic tape are then processed in the laboratory by data processing systems such
tery in conjunction with an inverter. The echo sounder data recorded on the mag-
entire system is monitored with an oscilloscope; it is powered by a 12-volt bat-
converting acoustic data to a frequency compatible with the tape recorder. The
on a towed vehicle, and an analogue magnetic tape recorder with an interface for
with an internal calibration oscillator, a chart recorder and transducer mounted
function of data processing equipment. The system consists of an echo sounder
large vessels are not available), and eliminates the risk of failure due to mal-
because it reduces the cost of surveys, permits access to remote locations (where
ource assessment that can be used on small boats. Such a system is desirable

This bulletin describes a portable data collection system for fishery re-

A PORTABLE HYDROACOUSTIC DATA ACQUISITION SYSTEM
2.12) FOR FISH STOCK ASSESSMENT

horne, Richard E., Edmund P. Nunnallee, and James H. Green
SG 72-4, 14 pp. (Dec. 1972) (Division of Marine Resources, University of Washing-
ton, Sea Grant Program, Seattle, WA 98195) Price not given.

0.7 (2.8)(5.4)

Cooking treatment	Weight loss of chicken breast	Volume of drip formed	Moisture content of cooked meat
	%	ml./100 g.	%
Microwave	26.6	2.69	65.5
Conventional	22.7	3.95	67.5

Cooking treatment	Relative amount of vitamin B6 retained expressed as a percentage of the raw meat		
	Cooked meat	Drip	Total
Microwave	91	1.5	92.5
Conventional	83	5.4	88.4

[1 figure, 5 tables, 16 references] FTP

1.0161

S. aurita migrate between Cape Verde (lat. 14°45' N.) and Cape Timiris (lat. 19°30' N.) beyond the slope of the continental shelf. Large concentrations were found at depths between 200 and 350 m.; the seabed sounded 600 to 1,500 m. deep. They migrate with the 18° C. surface isotherm at a speed of 30 nautical miles per day. After dusk they ascend to the surface at a rate of 2 to 2.5 m. per minute. Catches up to 150 metric tons per vessel per night were then taken by commercial purse seiners. The deep scattering S. aurita were not confined to a definite temperature. They migrated through a difference of more than 6° C. During the day they stayed in waters at temperatures of 12° to 13° C., and at night they ascend to the surface waters at 18° to 19° C.
[7 figures, 1 table, 4 references] S

1.3 PACIFIC MARINE FISHERIES COMMISSION. BULLETIN 8, 1972

Verhoeven, John P. (editor)
Pacific Marine Fisheries Commission Bulletin, No. 8, 84 pp. (1972) (342 State Office Building, 1400 S.W. Fifth Avenue, Portland, OR 97201)

Bulletin No. 8 contains the following articles. Plugs (Lures) in the management of the California Troll Salmon Fishery by L. B. Boydstun. p. 5; Estimated Numbers of Salmon Hooked and Released by Washington's Commercial Troll and Ocean Sport Fisheries in 1970-1971, by Sam Wright, p. 15; Experimental Use of Barbless Hooks in Oregon's Troll Salmon Fishery, by Jerry A. Butler and Robert E. Loeffel, p. 23; Geographic Origin Trends and Timing of Washington's Troll Salmon (Oncorhynchus) catches, 1960-1969, by Sam Wright and Richard Brix, p. 31; Size and Characteristics of Chinook Salmon Taken by Washington's Commercial Troll and Ocean Sport Fisheries, 1963-1969, by Sam Wright, Richard Kolb, and Richard Brix, p. 37; Maturity Rates of Ocean Caught Chinook Salmon, by Sam Wright and John Bernhardt, p. 49; Evaluation of the March 15-April 15 Pacific Coast Troll Chinook Closure, by Peter K. Bergman and Robert E. Loeffel, p. 61; Economic Evaluation of Washington's 1967 Troll Salmon Fleet, by Mike Fraidenburg, p. 75, and Comparison of Retention of Anchor and Spaghetti Tags by Salmon, by Jerry A. Butler and Robert E. Loeffel, p. 81. SW

1.87 INVESTIGATIONS INTO THE EFFECTS ON LOBSTERS OF RAKING IRISH MOSS, 1970-1971

Scarratt, D. J.
Fisheries Research Board of Canada, Technical Report, No. 329, 20 pp. (1972) (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada)

The value of seaweeds harvested from the Canadian Atlantic Provinces in 1970 was $3 million. About half of this amount is the value of moss harvested off Prince Edward Island. Most of the seaweed is Chondrus crispus, Irish moss. Rakes are used to dislodge the moss from the rocks. The rakes are up to 9 ft. (3 m.) wide and are towed by power boats at about 2 knots.

In contrast, the lobster fishery has been the principal inshore fishery resource of the provinces. Landings have fluctuated between 7.4 and 10.1 million pounds annually. In 1970, the catch was 8.2 million pounds valued at $5.8 million.

Most of the areas raked for moss are also fished for lobsters, sometimes intensively. Under these conditions raking for moss could never begin until the end of the lobster season because of the large number of traps on the bottom. There was no conflict between the two activities until mechanized rakers entered areas where moss had not been gathered before. The number of broken lobsters seen in mechanically raked moss was higher than in older raked areas and there was concern among lobster fishermen that damage to the stocks and the ground would result from continued raking.

Investigations of the conflicting interests were undertaken. The results indicated that damage to lobster stocks by moss raking is related to abundance of

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1.93 SOME OBSERVATIONS OF SEA TURTLE NESTING ACTIVITY IN COSTA RICA

Richard, J. D. (Div. of Functional Biology, Rosenstiel School of Marine and Atmospheric Science, Miami, FL 33149), and D. A. Hughes (P.O. Box 104, Barberton, E. Transvaal, South Africa)
Marine Biology 16, No. 4, 297-309 (Oct. 1972)

Marine turtles are particularly vulnerable to predation, human and other, when they congregate off nesting beaches and when they come ashore to nest. Most species of marine turtles show an apparent strong preference for particular nesting beaches, and they are sometimes able to return to such beaches in subsequent years. This study was made along the coasts of Costa Rica to learn more about the process of nesting-site selection, and to identify possible relationships between spatial distribution of nesting activity and the physical features of the coast and contiguous waters.

Observations of sea turtle nesting activity and physical characteristics of the coast were made from a low-flying airplane. The distribution of tracks along both coasts showed that nesting activity does not correlate well with nesting sites, but seems to be related to proximity and accessibility of the beach to offshore current systems. Such currents have a significant role in transporting sea turtles to the vicinity of nesting beaches.

Two major nesting beaches of the Pacific Ridley Lepidochelys olivacea were found on the west coast of Costa Rica each having aggregations of over 100,000 females during the months of September to November. The same beach is used in

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2.00 POST-MORTEM BIOCHEMICAL CHANGES IN THE MUSCLE OF GULF SHRIMP, PENAEUS AZTECUS

Flick, George J., and Richard T. Lovell (Dept. of Food Science, Louisiana State University, Baton Rouge, LA 70803)
Journal of Food Science 37, No. 4, 609-611 (July-Aug. 1972)

This work was carried out to expand our knowledge on the biochemical changes that take place post-mortem in the muscle of Gulf shrimp. The objective was to compare the postmortem degradative pathways in shrimp with those in other marine and terrestrial animals so as to provide a meaningful biochemical definition of rigor mortis in shrimp muscle, and to examine the possibility of some of these degradation products serving as indices of quality of chilled shrimp. The brown shrimp were held and fed in live holding tanks for 2 to 4 days before being used in the tests. They were quickly slaughtered by snipping off their heads with scissors. Samples for immediate (0-time) analysis were dropped into liquid nitrogen. The samples for analysis following storage were packed in plastic bags and immersed in crushed ice. Determinations were made for adenosine triphosphate (ATP) adenosine diphosphate (ADP), adenosine monophosphate (AMP), inosine monophosphate (IMP), inosine (INO), and hypoxanthine (Hx) using thin-layer chromatography (polyethyleneimine cellulose on thin-layer chromatograms) and spectrometric analysis. Glycogen, lactic acid, and orthophosphate content were measured by colorimetric methods of analysis; pH was also determined; and the storage time was 10 days.

The route of degradation of ATP was: ATP→ADP→AMP→IMP→INO→Hx. Glycogen content decreased from 160 mg. per 100 g. of tissue to 70 mg. after 10 days' storage of

(over)

1.87

lobsters and roughness of terrain. Where moss beds are smooth, cover for lobsters is scarce, and the number of lobsters will be low. On rougher terrain, lobster numbers will be high. They will be under boulders and few will attempt to avoid the rake.

Based on the information gathered from the investigation, recommendations were made to: (1) develop more effective, less damaging moss harvesting systems; (2) establish seasons for moss raking that would provide for good moss harvest and not conflict with lobster fishing; (3) limit the number of moss rakers; and (4) continue prohibition of moss raking off the eastern coast of Prince Edward Island to prevent damage to the lobster harvest.

[2 figures, 12 tables, 9 references] SW

2.00

the shrimp in ice. At the same time, the lactic acid level increased from 160 mg. per 100 g. of tissue to 370 mg. During the 10-day storage period, pH rose from 7.4 to 8.2 orthophosphate decreased from 3,078 µg. per 100 g. of tissue to 725 µg.

The initial IMP level in the shrimp was much higher than that found in mammalian muscle. IMP probably contributes to the characteristic flavor of fresh shrimp. Hypoxanthine accumulated in large quantities during storage of the shrimp. Perhaps hypoxanthine could be used as an indicator of the length of time shrimp have been held in iced storage. Flavor deterioration of the iced shrimp might be related to the production of inosine and hypoxanthine. The glycogen levels in shrimp are lower than those in fish, but the glycogen decrease-lactic acid increas pattern is similar to that of other marine animals and of land animals. However, there was not an initial postmortem drop in pH of the shrimp tissue, and this phenomenon may be unique for shrimp.

[2 figures, 1 table, 21 references] FTF

1.953 THE WHALE

Cousteau, Jacques-Yves, and Philippe Diolé
Translated from the French by J. F. Bernard
Published by Doubleday & Company, Inc., Garden City, N.Y. (1972), 304 pp. Price not given.

This book is an attractive collection of information on whales. Accompanied by color photographs that augment the text, the life and habits of the whale are explained. References to modern techniques of hunting the whale and how this type of hunting has endangered several species is described. The basic food of the baleen whale, krill (Euphausia superba) existing in polar water in great abundance, is described. The book has an index and a bibliography. SW

1.93

successive years. The aggregation of Ridleys off each of the nesting beaches is a gradual and continuing process. starting in July about 10,000 aggregate, and the number increases to above 100,000 before October. Large numbers persist into December.

The distribution of tracks suggests that river effluents are important in th aggregation of the turtles off a particular nesting beach and in subsequent recognition of the same beach.

Observations on the Pacific coast beaches indicate that over 500,000 sea turtles, 90% of them being Ridleys, nest yearly. Costa Rica is unique in the number and variety of sea turtles nesting on its shores. This phenomenon may be attributable to the geographical position of the country relative to the oceanic current systems off both coasts.

[8 figures, 11 references] SW

2.00 (4.5) OXIDATIVE RANCIDITY IN RAW FISH FILLETS HARVESTED FROM THE GULF OF MEXICO

Mendenhall, V. T. (Dept. of Food Science, University of Florida, Gainesville, FL 32601)
Journal of Food Science 37, No. 4, 547-550 (July-Aug. 1972)

The oxidation of raw fish muscle at refrigerated temperatures has not been considered significant to spoilage because most of the deterioration was attributed to microbial spoilage. More recent work seems to indicate that oxidation of the raw fresh fish muscle may be important in the deterioration of the meat stored at refrigerated temperatures. Eight species of fish (trout, grouper, blue fish, grunt, whiting, mullet, black sea bass, and mackerel) from the Gulf of Mexico were filleted and the skinned fillets were stored at 1° C. for from 8 to 15 days, depending upon the test series. The TBA (2-thiobarbituric acid) number (a measure of oxidative rancidity), total plate count, and sensory panel evaluations were made at periodic intervals during the storage period.

The development of oxidative rancidity (as determined by TBA values) was most important in the mullet fillets. The TBA numbers increased concurrently with decreases in the quality of the mullet fillets before the total plate count reached 400,000 bacteria per gram. Apparently, oxidative rancidity seemed to be more important than did microbial growth in the spoilage of mullet fillets stored at 1° C.
[1 figure, 5 tables, 18 references] FTP

2.05 (0.5) INCIDENCE OF VIBRIO PARAHAEMOLYTICUS IN SHELLFISH FROM EIGHT CANADIAN ATLANTIC SAMPLING AREAS

Thomson, W. K., and C. L. Thacker (Dept. of National Health and Welfare Research Laboratories, Health Protection Branch, Ottawa, Ontario, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1633-1635 (Nov. 1972)

V. parahaemolyticus, a pathogenic halophilic bacterium, is frequently implicated as the cause of food poisoning in Japan. During July to October 1971, 78 cultures of the organism, closely resembling strains isolated from human cases in Japan, were isolated from clams, mussels, and oysters from eight Canadian Atlantic areas. About 22% of the shellfish that were examined yielded cultures of V. parahaemolyticus; about one-half of the samples were detectable by direct plating, and the remaining one-half required enrichment procedures to facilitate detection of the small number of cells present. Because the numbers of V. parahaemolyticus in the shellfish appeared to be small, the possibility of food poisoning from the consumption of such small numbers would be unlikely. Earlier work by M. R. Smith [Cli. Med. 78, 22-25 (1971)] indicated that enteritis in man requires the ingestion of 10^6 to 10^9 bacteria. Nevertheless, the possibility of human disease cannot be completely dismissed if shellfish are not properly refrigerated during handling, storage, and transportation (V. parahaemolyticus multiples at temperatures as low as 10° C.).
[1 figure, 2 tables, 16 references] FTP

2.119 SURVIVAL AT SEA

Anonymous
Australian Fisheries 31, No. 10, 12-15 (Oct. 1972)

The worst that can happen to a boat is to be wrecked on a reef, burnt out, or capsized in a cyclone. If a fishing vessel goes down far from land or in a particularly remote area, in some circumstances, it may be days or even weeks before survivors can be found and picked up. Those adrift at sea for long periods must have determination and discipline, if they are to survive.

Morale, the first essential to survival, is a combination of willpower and determination to live, good discipline and good leadership. Every precaution should be taken to ensure that survival equipment is checked out before each voyage. First-aid kits and emergency packs should be complete, and liferafts should be inspected for chafing and wear. Since quick rescue depends upon the cooperation of the survivors, logically the ship's position should be radioed to the Coastal Radio Station when trouble is suspected. The CRS should be aware of the type of radio equipment that is being used in the liferaft so that they will know which frequency to use in planning rescue.

The following rules should be known and used when rescue is delayed: if you have to abandon ship, do not discard clothing; swim slowly and steadily; if necessary to swim through fire, jump upwind of the boat, feet first; swim into the wind using the breast stroke, and try to make breathing holes by splashing the flames away from head and arms; always try to protect yourself from the cold and extremes of temperature; in hot climates, clothing should be discarded, but the whole body should remain covered with one thin layer of material; the head and neck should especially be protected from the sun's rays.

 (over)

2.1471 PAIR TRAWLING FOR HERRING IN NEW ENGLAND

Taber, Robert E. (Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882), and James W. McLeod (Killybegs, Ireland)
Marine Bulletin Series No. 9, University of Rhode Island, 19 pp. (1972) Available from Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882)

Pair trawling may be as much as eight times more effective than single-boat midwater fishing depending on the type of fishing ground and size and horsepower of vessel. For a single boat operation minimum horsepower is about 600; however, under special conditions it may be as low as 350 and as high as 800. In contrast, in pair trawling the minimum horsepower for each vessel is about 150. The prime variables that determine minimum horsepower are net design, water depth, and whether the herring are spawning. Large mesh in trawls has greatly increased their fishing effectiveness. The large mesh reduces the drag and pressure wave of the trawl. Water depth is important due to the effect of vessel noise on herring. Down to 30 fathoms noise and lights will drive the herring away. The condition of herring is important. They become lethargic and easier to catch when spawning or ready to spawn.

The fishing grounds in the vicinity of Point Judith, R.I., vary in depth from 10 to 30 fathoms. The vessels fishing this area range in horsepower from 170 to 420. Single vessel fishing was not very successful in the period January to March 1972. In the same period, pair trawling over the same ground was much more successful.

(over)

2.05 EMERGING FOODBORNE DISEASES: II. FACTORS THAT CONTRIBUTE TO OUTBREAKS AND THEIR CONTROL

Bryan, Frank L. (Center for Disease Control, Public Health Services and Mental Health Administration, Dept. of Health, Education and Welfare, Atlanta, GA 30333)

Journal of Milk and Food Technology 35, No. 11, 632-638 (Nov. 1972)

Factors that contribute to foodborne disease outbreaks can occur at any point during production, processing, packaging, transportation, storage, preparation, and service. The factors involved may encourage contamination of foods with pathogens or toxic agents, or permit multiplication of bacteria. Also, certain procedures designed to destroy pathogenic organisms may fail in their purpose. This article is a review of the impact of change in food production, processing, and preparation on the foodborne disease problem and reports the results of a survey of factors that contributed to 493 foodborne disease outbreaks during the last 10 years. The 7 most significant of 18 identified factors were failure to properly refrigerate foods; poor personal hygiene practices by infected employees; preparing foods a day or more before they are served; adding raw, contaminated ingredients to foods that receive no further cooking; allowing foods to remain at warm temperatures; failure to reheat cooked foods properly; cross contamination; and failure to disinfect kitchen or plant equipment.
[1 table, 17 references] FTP

2.1471

A pair of side trawlers were used in trials of pair trawling. One was a 59-ft. wooden, eastern port-rigged trawler with a 220 hp. engine; the other was a 70-ft. wooden, eastern starboard-rigged trawler with a 170 hp. engine. The larger trawler handled the trawl, both weights, and the tow wires. For both tow wires and legs, 3/8-in. wire rope was used with a 2-fathom differential added to the bottom legs. After the shooting operation the smaller vessel came alongside the larger and was connected to the other tow wire of the trawl. The vessels spread apart to half the warp length out and began the tow. To haul, the reverse was followed. The capability of pair trawling was established in a few days of fishing. Pair trawling produced more than a third of all herring landed at Point Judith.

The advantages of pair trawling are: (1) the vessels' noise herds the herring toward the path of the trawl for water depths to 30 fathoms; (2) vessel power is used more efficiently because doors are not required; (3) the actual mouth opening of the trawl is wider for pair trawlers; (4) capitalization per vessel is generally about half that for a single boat operation; and (5) searching and fishing modes are more effective. The disadvantages of pair trawling are: (1) the crew and skippers of both vessels must work together physically and emotionally; and (2) in general, the depth of trawl cannot be controlled by speed of tow, but it is regulated by length of tow warp.

Useful information is included as: net plan diagram, warp angle meter that can be made by the fisherman, an illustration of a quick release towing hook, tables for warp angle related to warp length, herring landings from both types of fishing at Point Judith, and sample recordings of herring shoals.
[7 figures, 2 tables] SW

2.3 SHRIMP PROCESSING

Letchworth, H. R.; Seafoods Automation Corp. (pat.)
U.S. Patent 3,696,466
Food Technology 27, No. 1, 82 (Jan. 1973)

This apparatus is used for positioning shrimp during a processing stage. FTP

2.119

If there is no radio equipment or radio beacon, the heliograph or in its place a mirror, smoke generators, flares, and fluorescine dyemarkers must be ready for immediate use to aid detection. Fresh drinking water, the survivor's most essential need, can be limited to 1 pint (20 ounces) per day to keep fit, but survival is possible on 2 to 8 oz. a day. Suggested rationing is as follows: 1st day--no water, except for the injured; 2d to 4th day--14 oz. per head daily, if available; 5th day onwards--2 to 8 oz. per head daily, depending on the climate and the water available. Collect rainwater from the dinghy canopy and fill all available containers, but on no account should sea water be drunk because it contains more salt than the body can excrete. Alcohol and urine are also dangerous to drink, and fis juice is a poor substitute for water.

Obviously the preservation of water in the body is as important as having water to drink. Sweating, a potent cause of water loss, can be reduced by keeping cool, using sea water to dampen the body, and by taking advantage of the breezes. Sleep and rest are most important; exercise must be kept to a minimum. Vomiting should be prevented if possible and the mouth could be kept moist by sucking on a piece of cloth or button.

Only carbohydrate foods should be eaten when water is low because foods high in protein need more water for metabolism. Live off natural foods if water permi and save emergency rations for the real emergency when water is low. Some natura foods are fish, seaweed, and seabirds. The lower the dinghy rides in the water, and the lower its occupants sit or lie, the greater will be the effect of the current. If there is no compass, remember position can be deduced from the angle of the sun and the direction of the stars. The presence of an island can be detecte long before it can be seen by observation of: cumulus clouds, seabirds, lagoon glare, or drifting wood and vegetation. [2 figures, 1 table] Mary Ellen Enget

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2.3 METHOD AND APPARATUS FOR REMOVAL OF OIL FROM SURFACE OF FRIED FOOD PRODUCTS

Davidson, Arthur R., (West Linn, Oreg., U.S.A.), and John E. Haubner (Tigard, Oreg., U.S.A.) granted to Lamb-Weston Inc., Portland, Oreg., U.S.A. (pat.)
Canadian Patent 911,802
Patent Office Record (Canada) 100, No. 41, 4209 (Oct. 10, 1972)

After the food product is cooked in hot oil, it is removed from the oil and, to remove oil on the surface, immediately subjected to a blast of air saturated with water vapor. FTP

2.143
(0.8)

VOLTAGE AND PULSE RATES FOR INDUCING ELECTROTAXIS IN TWELVE COASTAL PELAGIC AND BOTTOM FISHES

Klima, Edward F. (National Marine Fisheries Service, Southeast Fisheries Center, Pascagoula Laboratory, Pascagoula, MS 39567)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1605-1614 (Nov. 1972)

Observations, at the laboratory level, were made on the reaction of certain fish to different voltages and direct current pulse rates. Such information on the electrical characteristics needed for inducing electrotaxis in fish would be useful in the designing of an automated fish harvesting system. The pelagic fish used were chub mackerel, scaled sardine, Spanish sardine, round scad, bumper, rough scad, Atlantic thread herring, round herring, silver anchovy, and butterfish; the bottom fish were Atlantic croaker, spot, and longspine porgy. The optimal electrical combinations for 12 of the fish varied according to species and length. The effective combinations ranged from 1.5 to 3.0 volts per 10 cm. and pulse rate of from 15 to 45 pulses per second with a pulse duration of 1.0 msec.
[6 figures, 5 tables, 17 references]

FTP

2.43
(3.238)

MICROBIAL ACTIVITIES THROUGH WRAPPING MATERIALS

Blankenagle, G. (Dairy & Food Science, University of Saskatchewan), and J. W. Card
Canadian Institute of Food Science and Technology Journal 5, No. 4, 222 (Oct. 1972

A major requirement of food wrapping material is to function as a barrier to microorganisms in the external environment. Nearly all materials for packaging perishable foods are impervious to cells of bacteria, yeasts, and molds; however, to retain desirable characteristics of food, such as meat color, several wrapping materials are designed to allow the passage of moisture and air. Consequently, nutrients may pass through the wrapping material and result in microbial growth on the outside of the package with subsequent changes in the food.

Ten films used as casings or wrappers for meat products were tested. Pieces of film 5 cm. in diameter were autoclaved; similar samples were not sterilized. The samples were placed on violet-red bile agar to test for growth of Escherichia coli and standard plate count agar for growth of Streptococcus lactis. A small amount of each organism was streaked on the wrapping materials in the plates without contacting the substrate agars. After incubation at 21° C. for 18 hr., the plates were examined for growth. The table shows the growth on various materials tested. Results of autoclaved samples were identical with those that were unautoclaved. Moistureproof wrappers did not permit growth.

(over)

2.3

LASER MODERNIZES OYSTER SHUCKING

Singh, Gurbax (Dept. of Natural Sciences, University of Maryland, Eastern Shore, Princess Anne, MD 21853)
Food Technology 26, No. 12, 60-61 (Dec. 1972)

Preliminary experimental work was carried out on the use of a laser beam to shuck oysters. A CO_2 laser with a 70-watt average power output was used. The beam was focused at a position on the shell where the adductor muscle is attached. The heat generated on this portion of the shell destroyed the adhesive layer of connective tissue and loosened the muscle from the side of the shell. As a result, the oyster gaped and the one side of the shell could then be detached. In these tests, the laser beam was applied only to one side (upper) of the shell--the oyster meat was then cut loose from the bottom shell. From 30 to 60 sec. were required to shuck an oyster (3.5 to 7.0 in. in length) using the low-power CO_2 laser. Future work might include use of higher power laser beams and the automatic exposure of both sides of the shell. Although considerably more research and development work is required, the author believes that the method might be economically adaptable to commercial use.
[3 figures, 5 references]

FTP

2.9

PARALYTIC SHELLFISH POISON AND MELANIN DISTRIBUTION IN FRACTIONS OF TOXIC BUTTER CLAM (SAXIDOMUS GIGANTEUS) SIPHON

Price, R. J., and J. S. Lee (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1657-1658 (Nov. 1972)

In a clam containing paralytic shellfish poison (PSP), the PSP is not evenly distributed; as much as 88% may accumulate in the siphon. The area of concentration appears to be associated with areas of melanin pigmentation. The present study was carried out to determine the distribution of PSP in fractions of toxic butter clam siphons in relation to that of melanin. The purpose was to find out if PSP is associated with the melanin in vivo.

Frozen toxic butter clam siphons containing about 10,000 mouse units of PSP per gram were used. The siphons were allowed to thaw and the meat and drip were separated. The thawed drained siphons were assayed for PSP; the remaining portion was then sonicated by a procedure described by R. J. Price and J. S. Lee [J. Fish. Res. Bd. Canada 28, 1789-1792 (1971)]. The sonicated siphon residue and the (sonication) melanin suspension were analyzed for PSP and for melanin. The original drip was assayed for PSP and for melanin.

The drip contained 11% of the PSP and 15% of the melanin originally present in the toxic clam siphons. The sonicated siphon residue contained 43% of the PSP and 32% of the melanin. The (sonication) filtrate contained 46% of the PSP and 53% of the melanin. The results appear to further implicate melanin as the paralytic shellfish poison binding agent in vivo.
[1 figure]

FTP

2.3 CRAB PROCESSING

Rossnan, M. (pat.)
U.S. Patent 3,692,465
Food Technology 27, No. 1, 82 (Jan. 1973)

Removal of visceral contents of cooked crab bodies is aided by the use of water pressure alone, or with air or suction. FTP

2.3 CARP PROCESSING

Biechele, D., Jr. (pat.)
U.S. Patent 3,690,899
Food Technology 26, No. 12, 77 (Dec. 1972)

The process involves removal of the "mud vein" of the carp, bleaching the meat in a cold salt solution, and removing fine longitudinally extending bones of the fish. FTP

2.3 APPARATUS FOR PROCESSING SHRIMP AND RELATED SHELLFISH

Jones, John M., Jr. (206 Grubb St., Hertford, NC 27944) (pat.)
U.S. Patent 3,703,746 (Nov. 28, 1972)

This apparatus removes the heads of the shellfish. The meaty portion is then deveined, deshelled, and graded for size. It is designed for use on shrimp and related shellfish on board the trawler. FTP

2.3 YIELD AND ACCEPTABILITY OF MACHINE SEPARATED MINCED FLESH FROM SOME MARINE FOOD FISH

Crawford, D. L., D. K. Law, and J. K. Babbitt (Dept. of Food Science and Technology, Oregon State University Seafoods Laboratory, Astoria, OR 97103), and L. S. McGill (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Food Science 37, No. 4, 551-553 (July-Aug. 1972)

The yield and acceptability of machine separated minced fish flesh from orange rockfish, yellowtail rockfish, English sole, Dover sole, Pacific hake, ling cod, and true cod were determined. A laboratory size fish separator was used; it separated, in minced form, the flesh from dressed fish. The results were compared with those using the fillets of the same species of fish. Machine separation yielded from 34.4% to 101.9% more edible flesh than that obtained from hand filleting. The portions prepared from frozen blocks of minced flesh had a lower moisture content and higher fat content than did portions prepared from frozen blocks of fillets. An evaluation panel preferred the portions prepared from blocks of frozen fillets over those prepared from minced flesh. However, the portions prepared from the minced flesh of the two rockfish species and three "cod-like" species were highly acceptable to the panel. The portions prepared from the minced flesh of the English sole and the Dover sole gave low acceptability scores; apparently, odor and flavor components associated with the skin carried through to the minced flesh. Addition of sodium tripolyphosphate to the 0.3% level did not improve the quality of the minced fish portions. The results indicate that frozen portions prepared from minced fish flesh are sufficiently acceptable to encourage market development of such products.
[5 tables, 7 references] FTP

2.43 (3.238)

Material	Use	Growth	
		E. coli	S. lactis
Cellulose acetate sprayed on parchment paper	Casing for barbeque loaf	+	+
	Casing for boneless smoked ham	+	+
Cellulose acetate	Casing for summer sausage	-	-
Cellulose acetate	Casing for cottage roll (pork butt)	+	+
Irradiated polyethylene	General wrapping	+	+
Laminated polyethylene	Wrapping steakettes	-	-
Polyethylene	Ham mold	-	-
Cellulose acetate	Casing for wieners	-	-
Cellulose acetate sprayed on parchment paper	Casing for bologna	+	+

[1 table, 3 references]

2.9 EFFECT OF CATIONS ON THE INTERACTION BETWEEN PARALYTIC SHELLFISH AND BUTTER CLAM (SAXIDOMUS GIGANTEUS) MELANIN

Price, R. J., and J. S. Lee (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1659-1661 (Nov. 1972)

Earlier work by the authors seemed to indicate an interaction between paralytic shellfish poison (PSP) and natural and synthetic melanin; this interaction was electrostatic in nature and was influenced by pH. Because the interaction between PSP and melanin may play an important role in the retention of the poison by butter clams, the present work was carried out to further characterize the nature of the PSP-melanin interaction. The binding of PSP by melanin in the presence of certain cations and the effect of cations on a PSP-melanin complex were examined. Such information should help define more clearly the electrostatic nature of the interaction and possibly reveal a method of desorbing bound PSP with salt solutions. A purified suspension of butter clam melanin was prepared and used; and purified powdered PSP was used.

The amount of PSP bound by melanin decreased by 68% in the presence of Al^{+++}; decreased by 62% with Ca^{++}; 57% with Ba^{++}; 17% with Na^{+}; and 15% with K^{+}. Salt solutions containing 0.01-M of Al^{+++}, Mg^{++}, Ca^{++}, Ba^{++}, Na^{+}, or K^{+} caused desorption of PSP bound to melanin by 54, 34, 28, 19, 11, and 4%, respectively. These results confirm the conclusion, arrived at from earlier experiments, that the PSP-melanin interaction is reversible and is electrostatic in nature.

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3.2383 FROZEN FISH PACKAGE

Vessie, A. M.; The Price Co. Ltd. (pat.)
U.S. Patent 3,690,923
Food Technology 26, No. 12, 76 (Dec. 1972)

This packaging folder is formed from a fibrous board coated on one side with a release coating permeable to air and on the other side with wax impervious to water and water vapor. FTP

3.231 FREEZING METHODS AS RELATED TO COST AND QUALITY

Rasmussen, Clyde L., and Robert L. Olson (Western Regional Research Laboratory, ARS, U.S. Dept. of Agriculture, Berkeley, CA 94710)
Food Technology 26, No. 12, 32, 34, 36-38, 41, 44, 47 (Dec. 1972)

The authors propose a formula for choosing a freezing system. The equation is $V = \frac{Cq}{C}$,
where V is the value of a freezing system, Cq is the quality a customer is willing to pay for the food product, and C is the lowest cost that will produce the desired quality. The best systems, thus, give the highest ratings for V. The authors analyze the formula and discuss its application, then they review some of the commercial freezing methods now in use.
[11 figures, 3 tables, 7 references] FTP

3.2340 LOBSTER PROCESSING

Moore, R. (pat.)
U.S. Patent 3,692,545
Food Technology 27, No. 1, 82 (Jan. 1973)

Lobsters are cooked in boiling salted water, cooled in fresh water at 45° F., then packaged in plastic bags. The packaged lobsters are then further cooled and frozen over a 2- to 12-hr. period. During the process, the lobsters are kept upside down. FTP

3.12 (6.54) BOILED FISH PASTE

Kyowa Hakko Kogyo Co. Ltd. (pat.)
Japanese Patent 31030/72
Food Technology 27, No. 1, 82 (Jan. 1973)

A water-oyster extract is incorporated into fish paste products as a preserv- FTP
ative.

2.9 USE OF POLYPHOSPHATES IN RED MEAT, POULTRY, AND SEAFOOD PROCESSING

The reversibility of the interaction in the presence of cations or hydrogen ions suggests a method for detoxifying clams. It may be possible to reduce PSP levels in toxic butter clams by holding live clams (or soaking minced clams) in solutions containing polyvalent cations; the cations would compete with the PSP for binding sites in the clam. FTP
[1 table, 9 references]

Mahon, John H., K. Schlamb, and E. Brotsky (Calgon Corp., Pittsburgh, Pa.)
Chemical Abstracts 77, No. 15, 99696f (Oct. 9, 1972)

3.2340 (3.12) WHALE-MEAT PROCESSING

Nippon Suisan Kaisha Ltd. (pat.)
Japanese Patent 27033/72
Food Technology 26, No. 12, 77 (Dec. 1972)

Slices of whale meat are soaked in aqueous calcium hydroxide. The meat is FTP
then coated with a mixture of lactic acid and casein, then frozen.

3.27 IMPROVEMENTS IN OR RELATING TO THAWING FROZEN FOODSTUFFS

National Research Development Corporation (A. C. Jason) (pat.)
British Patent 1,272,396
BFMIRA Abstracts 25, No. 6, Abstract No. 2341, 472 (June 1972)

A method and apparatus for thawing foodstuffs is described. The frozen foo
stuffs are placed in an enclosed space in which the pressure is reduced. Water
at a temperature below that at which deterioration to the foodstuff by cooking
would be caused, is then added. The water gives off vapour which condenses and
thaws the frozen foodstuff. Reprinte

2.113 BASIC STUDIES ON THE ANTIFOULING BY ULTRASONIC WAVES FOR SHIP'S BOTTOM FOULING ORGANISMS. II. INFLUENCES OF ULTRASONIC WAVES ON THE LARVAE OF BARNACLES, BALANUS AMPHITRITE AND MUSSELS, MYTILUS EDULIS USED TOGETHER WITH POISONOUS SUBSTANCES

Suzuki, Hiroshi, and Kenjiro Konno (Fish. Navig. Lab., Tokyo, Japan)
Chemical Abstracts 76, No. 21, 122920q (May 22, 1972)

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9 MAKING ANTIMICROBIAL-SUPPLIED PLASTICS
.43) FROM AQUEOUS POLYURETHANE DISPERSIONS

berle, Wolfgang, and Brigitte Hamburger (Farbenfabriken Bayer A.-G.) (pat.)
rman Offen. (Patent) 2,031,201 (Dec. 30, 1971)
emical Abstracts 76, No. 22, 128134h (May 29, 1972)

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340 FISH PROCESSING
.12)

mori Prefecture (pat.)
panese Patent 27946/72
od Technology 26, No. 12, 77 (Dec. 1972)

Finely divided fish meat is mixed with an alkali metal salt of orthophosphoric
id and a saccharide. This treatment helps prevent denaturation of the meat dur- FTP
g frozen storage.

3.5 A RAPID SALT-CURING TECHNIQUE

Anderson, Margaret L., and Joseph M. Mendelsohn (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Atlantic Fishery Products Technology Center, Emerson Ave., Gloucester, MA 01930)
Journal of Food Science 37, No. 4, 627-628 (July-Aug. 1972)

A quick laboratory scale method is described for salt curing ground fish. Skinless fillets are comminuted in a saturated salt solution containing enough excess salt to maintain saturation (the fish lose some fluid through syneresis). The liquid is then drained off and the residue is dried in a vacuum drum dryer or in moving air. The dried product is then vacuum packed in mylar pouches which are packed in cardboard cartons. For possible commercial production the authors recommend the use of a meat and bone separating machine.
[2 tables, 4 references] FTP

6.193 FISH SOLUBLES AS A PARTIAL SUBSTITUTE FOR MILK AND MILK BY-PRODUCTS IN LIQUID RATIONS FOR NEONATAL ANIMALS

Bauersfeld, Paul E., Jr., and Joseph H. Soares, Jr. (College Park Fishery Product Technology Laboratory, National Marine Fisheries Service, NOAA, College Park MD 20740)
Fishery Bulletin 70, No. 4, 1275-1279 (Oct. 1972)

This paper presents (1) a literature review of the use of fish protein in milk replacers for neonatal animals, (2) a list of criteria for proteins used in milk replacers, and (3) reports on three experiments in which menhaden fish solubles were partially substituted for milk protein in milk replacer rations.
Initial experiments reported here indicated that low levels (5%) of fish solubles produced equal calf growth when they replaced a similar amount of milk products in veal calf rations. However, the addition of 15% freeze-dried solubles at the expense of dried skim milk (DSM) did not produce satisfactory growth in young lambs. This was true even when lecithinated soy flour or delactosed whey powder supplemented part of the protein in the ration. Therefore, it is concluded that if significant quantities of fish protein are to be incorporated into milk replacer rations, protein of higher quality than that present in fish solubles must be used.
[3 tables, 8 references] Authors' abstract

4.5 SOME PECULIARITIES IN THE KINETICS OF THE INITIAL STAGE OF UNSATURATED FATTY ACID AUTOXIDATION. II. AUTOXIDATION RATES OF METHYL LINOLEATE AND METHYLOLEATE AND THEIR RATIO

Yanishlieva, N., and A. Popov
Nahrung 15, No. 4, 403-412 (1971) (In German, English summary)
BFMIRA Abstracts 25, No. 1, Abstract No. 69, 15 (Jan. 1972)

4.5 EFFECT OF THE OXIDATION OF OILS ON THE DETERIORATION OF FOODS. I. OXIDATION OF OILS IN A MODEL SYSTEM

Goto, Miyoko, Takehito Shirahama, Teishiro Nakagawa, and Kazuo Shibasaki (Tohoku Univ., Sendai, Japan)
Chemical Abstracts 77, No. 5, 32872s (July 31, 1972)

6.199 INFLUENCE OF DIETARY FISH MEAL ON EGG FATTY ACID COMPOSITION

Navarro, J. G., J. C. Saavedra, F. B. Borie, and M. M. Caiozzi (Departamento de Quimica Inorganica Analitica, Facultad de Quimica y Farmacia, Universidad de Chile, Casilla 233 Santiago, Chile)
Journal of the Science of Food and Agriculture 23, No. 11, 1287-1292 (Nov. 1972)

In this study, diets containing various levels of fish meal were fed to chickens to determine the effect of the fish meal on the fatty acid composition of the chicken eggs. Chilean hake fish meal containing 8.2% fat was used in these feeding tests with pullets. The fish meals were used in the diets at 10, 20, and 30 g.% levels; the fish oil content of the resulting rations was 0.82, 1.64, and 3.28%, respectively. The basal diet contained 0.5% fatty acid. The fatty acid distribution in the lipid fractions of the yolks of the eggs of pullets fed a basal diet (contained no fish meal or fish oil) and the test diet containing 20 g.% fish meal (or the equivalent of 1.64% fish oil) is shown in the table that follows. The changes produced in the fatty acid composition of the lipids of the eggs approach that found in the diets of the pullets. Apparently, the long-chain polyunsaturated fatty acids are deposited preferentially in the phospholipids (the highest levels were found in cephalin and lecithin).

(over)

4.83 FISH OIL ALKYDS. III.

Bhatt, H. A., and P. V. Tagdiwala (Dep. Chem. Technol., Univ. Bombay, Bombay, India)
Chemical Abstracts 76, No. 24, 142449w (June 12, 1972)

6.199

Fatty acid	Amount of fatty acid in egg yolk lipids											
	Total fatty acids (%)		Neutral lipids (%)		Cephalin (%)		Lecithin (%)		Sphingomyelin (%)		Lysophosphatidylcholine (%)	
	A	B	A	B	A	B	A	B	A	B	A	B
16:0	29.9	27.6	26.1	26.3	45.3	21.9	27.9	37.1	52.0	23.7	20.6	24.4
16:1	5.3	4.3	5.0	4.7	4.6	2.2	tr	3.0	--	3.9	--	6.2
18:0	10.5	10.7	6.9	7.6	13.6	30.7	7.7	7.2	--	11.1	6.5	23.6
18:1	41.4	39.4	52.7	50.3	28.2	20.5	36.3	28.0	32.1	21.8	29.6	30.6
18:2	8.1	12.4	5.2	9.4	4.1	7.5	21.6	14.3	15.9	3.1	30.3	4.7
18:3ω3	0.9	1.3	0.8	1.2	0.9	0.4	6.5	0.5	--	1.6	3.2	1.2
20:2ω6	--	tr	tr	0.2	--	--	--	--	--	34.8	--	--
20:3ω6	--	tr	--	--	--	--	--	--	--	tr	--	1.2
20:4ω6	1.4	1.7	0.5	0.2	1.8	0.9	--	--	--	--	9.8	3.9
20:4ω3	0.1	1.5	0.4	tr	tr	8.3	tr	3.1	--	--	--	--
20:5ω3	tr	0.8	0.7	tr	--	0.2	tr	2.9	--	tr	--	--
24:0	--	tr	--	tr	--	0.4	--	tr	--	tr	--	--
22:4ω6	--	tr	--	tr	--	0.4	--	0.5	--	tr	--	1.2
22:5ω6	--	0.2	--	tr	--	0.9	tr	0.4	--	--	--	tr
22:5ω3	2.2	tr	--	tr	--	0.4	--	tr	--	--	--	tr
22:6ω3	tr	0.1	1.5	tr	tr	5.3	tr	3.0	--	--	--	3.1

Notes: A: Basal diet (without fish meal).
B: Diet containing 20% fish meal or the equivalent of 1.64% fish oil.
tr: Trace.

3.63 DRIED FISH PRODUCT

Hasegawa, K. (pat.)
Japanese Patent 22268/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Fresh fish flesh (low fat content) is reduced in an aqueous solution containing a sugar alcohol (such as sorbitol) and the aqueous mixture is spray dried. Reconstitution of the dried material yields a product which has a freshlike appearance. FTP

6.190 COMPOSITION AND NUTRITIVE VALUE OF FISH MEALS

Buraczewska, Lucyna, Stanislaw Buraczewski, Stafania Lubaszewska, Barbara Pastuszewska, and Teresa Zebrowska (Inst. Anim. Physiol. Nutr., Jablonna/Warsaw, Poland)
Chemical Abstracts 77, No. 15, 99995c (Oct. 9, 1972)

6.3 PAST, PRESENT AND FUTURE OF THE SEAWEED INDUSTRY

Druehl, Louis D. (Dept. of Biological Sciences, Simon Fraser University, Burnaby, British Columbia, Canada)
Underwater Journal and Information Bulletin 4, No. 5, 182-191 (Oct. 1972)

Man has used seaweed for as long as 5,000 years. The most significant products of seaweed are the phycocolloids agar and algin. Recent studies indicate that other seaweed products have a great potential as food and fodder supplements, and their unique medicinal properties have been discovered. There is a trend toward mariculture which is complicated by pollution, pests, and disease.

Seaweeds are macroscopic algae attached to the grounds of intertidal and shallow waters of the world's seas. Their vertical growth is limited by available light, and economically important species lie in depths of less than 40 m. Examples of algae classification follow: Chlorophyta (green algae) division--Ulva (sea lettuce); Phaeophyta (brown algae) division--Macrocystis (giant kelp); and Rhodophyta (red algae) division--Chondrus (Irish moss, carragheen).

The industrial use of seaweed began during the 17th century in Western Europe with the production of soda and potash from burned brown algae--species of Laminariales and Fucales. In 1812, iodine was found in kelp ash and the kelp industry was the major source of this element for many years. Phycocolloids began to be recovered from seaweed late in the 19th century. These colloids are mucilaginous polysaccharides and constitute 10 to 65% of the dry weight. Agar, algin, and carrageenan are the phycocolloids of greatest importance and all are used in foods and drugs.

Oriental peoples make the most of seaweed as food; over 100 species are eaten by Chinese, Japanese, and Hawaiians. The thin-bladed red algae Porphyra is

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6.32 (8.53) THE BIOCHEMICAL ANALYSIS OF SOME ESTUARINE PHYTOPLANKTON SPECIES. I. FATTY ACID COMPOSITION

De Mort, Carole L., Robert Lowry, Ian Tinsley, and H. K. Phinney (Dept. of Botany and Plant Pathology and Dept. of Agricultural Chemistry, Oregon State University, Corvallis, OR 97331)
Journal of Phycology 8, No. 3, 211-216 (Sept. 1972)

This paper reports the fatty acid composition of 10 species of estuarine phytoplankton as determined by gas-liquid chromatography. Nine of the ten species were from Yaquina Bay, Oreg., and were common components of the phytoplankton of the bay. The nine species were Tetraselmis suecia, Chlorella protophila, Chlamydomonas palla, Cryptomonas salina, Prymnesium parvum, Cylindropyxis sp., Cylindrotheca gracilis, Navicula abscondita, and Navicula biskanteri. The tenth species Isochrysis galbana was from the Culture Collection of Algae at Indiana University. The organisms consisted of three species of Chlorophyta, one species of Cryptophyta, and six species of Chrysophyta.

Twenty-eight fatty acids were identified in the 10 species of phytoplankton. The fatty acids common to all 10 species were 14:0, 16:0, 16:1, 18:0, 18:1, and 18:2. The Chlorophyta had very low amounts of C_{18} acids and high proportion of $C_{20:5}$ acids. All the phytoplankton species had a high proportion of palmitic acid (16:0).

[5 tables, 29 references] FTP

6.35 A PRELIMINARY FEASIBILITY STUDY OF IRISH MOSS HARVESTING SYSTEMS

Patell, James M.
Report No. MITSG 72-14, 64 pp. (June 30, 1972) (Sea Grant Office, Massachusetts Institute of Technology, Cambridge, MA 02139)

Irish moss (Chondrus crispus) is one of the red algae (Rhodophyceae). The plant is a small seaweed, 2 to 15 in. high, sturdy and thick in growth with multiple branches resembling parsley. A holdfast secures the plant to rocky substrates. It grows from just above low-water level down to a depth of 20 to 30 ft. C. crispus is found along the coast from Newfoundland to New Jersey, from Norway to the coast of North Africa, and the coast of the Phillipine Islands. Irish moss is the chief source of carrageenan which is used in the food, cosmetic, pharmaceutical, and other industries as a stabilizer, gelling agent, and viscosity control agent.

In the United States the major suppliers of Irish moss are located in Maine and Massachusetts. Canadian waters on the coasts of Nova Scotia, Prince Edward Island, and the Northumberland Strait support large beds of the plant. All Irish moss harvested in the United States is sold to one company based in Rockland, Me., and American sources account for only 5 to 10% of the Irish moss purchased by the company. The company owns a mechanical drying plant on Orr's Island off the Maine coast but has not operated it in 1971 or 1972. The only other mechanized drying plant in the United States is operated by another supplier of Irish moss in Kingston, Mass. This company operates an Irish moss harvesting system of its own for the drier. Thus price offered by the Rockland, Me., company is settled since there is no competitive bidding. The Food and Agricultural Organization of the

 (over)

6.50 FISH PROTEIN SOLUBILIZATION

Faith, W. T., Jr., R. B. Steigerwalt, E. A. Robbins; Rohm and Haas Co. (pat.)
U.S. Patent 3,697,285
Food Technology 27, No. 1, 82 (Jan. 1973)

Alkaline bacterial protease is used to effect solubilization and extraction of protein from fish, fish products, or fish parts. FTP

6.50 FISH TASTE IMPROVEMENT

Astra Nutrition AB (pat.)
German Patent 1,692,393
Food Technology 26, No. 12, 77 (Dec. 1972)

The flavor of fish meals is improved by using a butanol extraction process. FTP

6.39 SEAWEEDS AS MANURE. III. FIELD MANURIAL TRIALS ON PENNISETUM TYPHOIDS S.H. (PEARL MILLET) AND ARACHIS HYPOGEA (GROUNDNUT)

Bokil, K. K., V. C. Mehta, and D. S. Datar (Central Salt and Marine Chemicals Research Institute, Bhavnagar, India)
Botanica Marina 15, No. 3, 148-150 (Sept. 1972)

In another report, estimates were given that 10,000 tons of dry harvestable seaweeds are available on the semi-arid coastal area of Saurashtra and Kutch region of Gujarat State, India. Experiments were performed to determine the usefulness of seaweed as an auxiliary fertilizer without detriment to pearl millet and groundnut crops. The seaweeds consisted of brown seaweeds and drift seaweeds which were a mixture of red, brown, and green seaweeds. The experiments were conducted over a 3-year period, 1966-1968.

In tests on pearl millet, the effects of nitrogen in the form of ammonium sulfate, seaweed manure, and farmyard manure were studied at two levels: 5 kg. and 10 kg. N per acre. In tests on groundnut, nitrogen and phosphoric acid were applied at the level of 5 kg. N and 10 kg. P_2O_5 per acre. The nitrogen was supplied in the same forms used on pearl millet.

Results of the tests indicated that for pearl millet, although the yield was not altered, seaweed faborably influenced the quality of its grains and fodder in that nitrogen and phosphorus content increased. Results with groundnut crops were similar.

The authors concluded that seaweed improves the quality of crops, and in some cases, increases the yield. In addition, seaweed enhances the utilization of inorganic fertilizers.
[3 tables, 17 references] SW

6.37 ALGAE AND LITHOTROPHIC BACTERIA AS FOOD SOURCES

Vincent, W. A.
Symposia Soc. Gen. Microbiol. No. 21; Microbes Biol. Productivity, pp. 47-76 (1971)
BFMIRA Abstracts 25, No. 6, Abstract No. 2023, 410 (June 1972)

6.37 WORKING BASIS FOR USING MICROALGAE IN FOOD AND DIET

Soeder, C. J., H. Mueller-Wecker, W. Pabst, and H. Kraut (Kohlenstoffbiol. Forschungsstn.-e.V., Dortmund, Germany)
Chemical Abstracts 77, No. 15, 99932c (Oct. 9, 1972)

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the most popular in Japan; in 1970, 10,981 tons were harvested with a market value of $153 million. Seaweeds are potentially important sources of carbohydrate, proteins, vitamins, and micronutrients, but their availability for human nutrition is not known. As a fodder ingredient, seaweed is reported to be high in nutritional values. Norway is a leading nation in research in this field. Fifty thousand tons of seaweed is produced annually for meal in Norway. The seasonal chemical uniformity of one seaweed used for meal allows a year-round harvest. It requires fortification with calcium, phosphorus, and magnesium.

Reports indicate that seaweed products act as vermifuges, anticoagulants of blood, and depressors of blood cholesterol levels. Antibacterial and antiviral activity against human and animal diseases have also been reported. As fertilizers, seaweeds are reported to be suppliers of trace elements and complexes which act as chelators. They are said to cause resistance to plant diseases and extreme temperatures; they induce fruit setting and retard senescence. Their application on alkaline and calcareous soils is reported to increase availability of nitrogen, phosphorus, potassium, and iron. Great Britain is a major producer of seaweed fertilizers.

Japan leads the world in total amount of seaweed harvested annually: 245,000 metric tons of brown algae in 1969. In contrast, Mexico's harvest was 26,700, and Scotland's was 24,400. Furthermore, Japan's harvest of red algae in metric tons was 134,000; Canada's was 43,900; and Argentina's was 19,400. Harvesting seaweed is one of the most difficult aspects of the industry. Most of the harvesting is on a cottage industry basis. Some mechanization has been introduced. Ultimately the future uses of seaweeds will be based on their chemical composition. Phycocolloids, antibiotics, food, fertilizer, and feeds are areas for continued development.
[10 figures, 6 tables, 35 references] SW

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United Nations listed in the following table moss landings and prices for 7 yr. with information on Canadian landings also.

Landings of Irish moss (lb.)

Year	United States	Canada	Price per lb. (wet)
1964	4,400,000	28,200,000	1.7 ¢
1965	4,620,000	39,240,000	1.7
1966	4,180,000	51,140,000	1.8
1867	5,060,000	79,340,000	1.75
1968	7,280,000	87,060,000	3.0
1969	5,060,000	96,760,000	3.0
1970	4,000,000	105,800,000	3.0

Estimates of the potential harvest from the Maine and Massachusetts coast indicated that it could be increased by a factor of two or more. The low price of wet weight harvested moss is the limiting factor in developing a harvesting system. In addition, uncertainty of price level plus uncertainty of possible buyers are other important factors. The harvest requires workers for only 6 months of the year. To attract a labor force this short work period would require compensating factors. The bottom topography where the moss grows is rough and requires rugged apparatus. Working in shallow water exposes all systems to wave actions, and the probability of damage is high.

The author concludes that the feasibility of developing and operating a mechanized Irish moss harvesting system for use in the United States is not economically justifiable at this time. A harvester has already been constructed and refined; however, operation of the entire system at the market price for Irish moss is prohibitive. [10 figures, 2 tables, 45 references, 2 appendices] SW

6.54
(0.6)

APPROACHES TO THE UTILIZATION OF FISH FOR THE PREPARATION OF PROTEIN ISOLATES. ISOLATION AND PROPERTIES OF MYOFIBRILLAR AND SARCOPLASMIC FISH PROTEINS

Spinelli, John, Barbara Koury, and Ruth Miller (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Pacific Fishery Products Center, Seattle, WA 98102)
Journal of Food Science 37, No. 4, 599-603 (July-Aug. 1972)

This work relates to the preparation of functional proteins from fish. The tissue of the Pacific ocean rockfish was separated into myofibrillar, sarcoplasmic, and nonprotein fractions and the physical, chemical, and organoleptic properties of each fraction were examined before and after they were dried.

The sarcoplasmic proteins contain a major portion of the substances that adversely affect the organoleptic stability of the proteins. They are severely denaturated by freeze drying. Myofibrillar proteins showed reduced solubility in neutral 5% salt (NaCl) from 70-80% to about 15% after freeze drying. They deteriorate (from the organoleptic standpoint) gradually even when treated with antioxidants. When the myofibrillar protein is extracted with polar organic solvents, organoleptic deterioration is prevented, but the functional properties of the protein are destroyed. The salt-soluble characteristics of the myofibrillar proteins are preserved for a short period of time when the proteins are co-dried with carbohydrates (includes sucrose, glucose, fructose, corn starch, and corn syrup solids).
[8 figures, 1 table, 23 references] FTP

6.54

DEVELOPMENT OF A PROCESS FOR PREPARING A FISH PROTEIN CONCENTRATE WITH REHYDRATION AND EMULSIFYING CAPACITIES

Cobb, Bryant F., III, and Kamaluddin Hyder (Dept. of Animal Science, Texas A&M University, College Station, TX 77843)
Journal of Food Science 37, No. 5, 743-750 (Sept.-Oct. 1972)

An ideal economic process for the manufacture of fish protein concentrate (FPC) would produce a product that: (1) possesses nutritive values similar to the fresh fish muscle, (2) regains moisture to the same level as that in the fish muscel, (3) is bacteriologically sterile, (4) is odorless and tasteless, or possesses a pleasing odor and taste, (5) is stable under atmospheric conditions, and (6) contains no toxic residues. Furthermore, the process might result in the recovery of a high-grade oil. This study was carried out in an attempt to develop such an FPC process and the present article reports the results.

Atlantic croaker Micropogon undulatus were dressed and cleaned. Salt (NaCl) was added to the fish and the mixture was ground. The pH of the mixture was adjusted to 2.5 using 1N HCl, a mixture of equal volumes of ethanol and hexane was added, and the entire mixture was heated at reflux temperature of the solvent (about 70° C.). The hexane was decanted and the ethanol was removed by filtration or centrifugation. The extraction process was repeated from two to four times. The protein concentrate was dried in air or vacuum-dried at 70° C. in a desiccator. The pH was adjusted to 2.5 to prevent protein-protein interaction. Salt was added to control gel formation.

The resulting FPC had an amino-acid spectrum similar to that of the muscle of the fresh fish, and it formed gels when added to water. The rehydrated material

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APPROACHES TO THE UTILIZATION OF FISH FOR THE PREPARATION OF PROTEIN ISOLATES. ENZYMIC MODIFICATIONS OF MYOFIBRILLAR FISH PROTEINS

Spinelli, John, Barbara Koury, and Ruth Miller (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Pacific Fishery Products Center, Seattle, WA 98102)
Journal of Food Science 37, No. 4, 604-608 (July-Aug. 1972)

The feasibility of modifying myofibrillar fish proteins by partially hydrolyzing them with proteolytic enzymes was examined. The object was to develop a basic method for the isolation and processing of partially hydrolyzed proteins into functional and organoleptically stable products. The myofibrillar protein was prepared from fillets of Pacific ocean rockfish. The enzyme Rhozyme P-11 was used to partially hydrolyze the myofibrillar protein. The protein was complexed with sodium hexametaphosphate, and the lipids were extracted from the protein-phosphate complex with azeotropic isopropanol. The dried isolates were practically free of flavor and odor, and they were able to emulsify over 200 times their weight of oil.
[8 figures, 1 table, 15 references] FTP

7.0

MOTION SENSITIVITY OF FLAME IONIZATION DETECTORS

Gularte, Ronald Carl (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Technical Report WHOI-72-52, 86 pp. (July 1972) (Prepared for NOAA office of Sea Grant Program) Woods Hole Oceanographic Institution, Woods Hole, MA 02543.

A portable gas chromatography, using a single flame ionization detector, was constructed. The unit was tested for response to surge, sway and heave accelerations up to 0.3g. Also the detector's response was studied for roll and pitch up to 25 degrees with periods ranging from 3 to 20 seconds. The effect on the detector's response of variation in hydrocarbon concentrations in the parts per million range was investigated and response increased with increasing concentration. Samples containing 1, 10, 100, 1,000, and 10,000 parts per million dodecane were analyzed, and under the higher accelerations trace distortion was evident for concentrations below 10 parts per million. Stationary isothermal chromatograms of a normal alkane sample (nC_6 - nC_{32}) were compared with those obtained under the various test conditions and no detectable difference in peak area (which represented approximately 1 microgram of the particular hydrocarbon) or retention time was evident. The limits of detection for the Aerograph detector were found to be 21.8×10^{-6} mg/sec for a 30 degree roll, 29.1×10^{-6} mg/sec for 20 degree pitching and 21.8×10^{-6} mg/sec for a 0.6g heave acceleration. For the range of translational and angular accelerations that might be expected on a platform at sea, it was found that medium resolution gas chromatography using a flame ionization detector can be conducted, but in the trace analysis region, trace distortion can be expected.
[30 figures, 3 tables, 20 references] Author's abstract

6.55 APPLICATION OF L-LYSINE SUPPLEMENTS TO MIXTURES WITH ANIMAL MEALS IN FATTENING PIGS. I. GROWTH, FEED USE AND CARCASS VALUE

Navratil, B., and A. Vlcek (Vyzk. Ustaf Vyzivy Zvirat, Pohorelice, Czechoslovakia)
Chemical Abstracts 76, No. 25, 152421v (June 19, 1972)

6.55 APPLICATION OF L-LYSINE SUPPLEMENTS TO MIXTURES WITH ANIMAL MEALS IN FATTENING PIGS. II. NITROGEN BALANCE, DIGESTIBILITY OF NUTRIENTS AND ENERGY

Navratil, B., and A. Vlcek (Vyzk. Ustav Vyzivy Zvirat, Pohorelice, Czechoslovakia)
Chemical Abstracts 76, No. 25, 152422w (June 19, 1972)

7.45 FLUOROMETRIC METHOD FOR DETERMINING NANOGRAM QUANTITIES OF NITRITE ION

Dombrowski, Lawrence J., and Edward J. Pratt (Sterling-Winthrop Research Institute, Rensselaer, NY 12144)
Analytical Chemistry 44, No. 14, 2268-2272 (Dec. 1972)

This paper describes the development of a highly sensitive fluorometric method for the determination of nitrite ion. The procedure involves the diazotization of p-chloroaniline and coupling with 2,6-diaminopyridine; the resulting azo product is further derivatized with ammoniacal cupric sulfate to produce a highly fluorescent triazole compound (excitation maximum of 360 nm.; fluorescence maximum of 430 nm.). The intensity of the fluorescence varies linearly with the concentration of nitrite. By this procedure, nitrite ion can be detected to a level of 2 nanograms per milliliter using a 10-ml. sample. At this level, the precision is 7%.
[5 figures, 4 tables, 16 references] FTP

6.55 FISH OFFAL AS A VALUABLE PROTEIN FEED FOR POULTRY

Alishеikhov, A. M., N. A. Osmanova, and M. Sh. Aliev (U.S.S.R.)
Chemical Abstracts 77, No. 5, 33273j (July 31, 1972)

6.54 EFFECT OF THE DURATION AND METHOD OF STORAGE ON CHANGES IN THE COMPOSITION AND QUALITY OF FISH, MEAT, AND BLOOD FLOURS

Pesut, Milovan, Tajana Crnojevic, Ivan Balzer, and Teodor Pozezanac (Fac. Agric., Univ. Zagreb, Zagreb, Yugoslavia)
Chemical Abstracts 77, No. 5, 32899f (July 31, 1972)

6.54

formed emulsions when blended with vegetable oils. The emulsifying and rehydration capacities of the FPC were dependent upon the pH; the minimum uptake of water and oil was in the pH range of 5 to 8.
[9 figures, 4 tables, 28 references] FTP

6.4 FISH EXTRACTS IN FOOD INDUSTRY

Watanabe, Yasuo (Riken Vitamin Oil Co., Ltd., Tokyo, Japan)
Chemical Abstracts 77, No. 13, 86684a (Sept. 25, 1972)

6.55 NUTRITIONAL MYOPATHY DUE TO VITAMIN E DEFICIENCY IN CALVES FED FISH PROTEIN CONCENTRATE AS THE SOLE SOURCE OF PROTEIN

Michel, R. L., D. D. Makdani, J. T. Huber, and A. E. Sculthorpe (Pathol., Michigan State Univ., East Lansing, Mich.)
Chemical Abstracts 77, No. 5, 33210m (July 31, 1972)

0.35 (0.38) DETOXIFICATION OF FOREIGN ORGANIC COMPOUNDS BY THE QUAHAUG MERCENARIA MERCENARIA

Carlson, Gary P. (Dept. of Pharmacology and Toxicology, College of Pharmacy, University of Rhode Island, Kingston, RI 02881)
Comparative Biochemistry and Physiology 43B, 295-302 (1972)

The metabolic pathways in detoxification of foreign organic compounds in quahog should be understood because this clam is used for food.

Experiments were performed to determine the routes of detoxification available to the quahog. Separate homogenates were prepared of quahog hepatopancreas, mantle, foot, and gills. Soluble, and microsomal fractions were obtained in 1.5% KCl with ultracentrifugation. The detoxification of the organophosphate insecticide O-ethyl O-p-nitrophenyl phenylphosphonothioate (EPN) was ascertained by measuring the end product, p-nitrophenol. This product was measured in the O-demethlation of p-nitroanisole. The N-demethylation of aminopyrine was determined by measuring the formaldehyde formed. The ability to oxidize hexobarbital was determined by measuring the amount of hexobarbital lost. The reduction of p-nitrobenzoic acid to p-aminobenzoic acid (PABA) was determined by measuring the amount of PABA colorimetrically.

Results of the tests indicated that no metabolism of EPN or O-demethylation of p-nitroanisole occurred using either whole liver homogenates, 9,000 g ultracentrifuge supernatant fractions, or microsomal fractions of the hepatopancreas. Whole homogenates of mantle, foot, or gill were also inactive with these compounds.

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7.8 (1.84) EVALUATION OF SCALLOP MEAT QUALITY BY THE RESAZURIN REDUCTION TECHNIQUE

Webb, N. B., F. B. Thomas, F. F. Busta, and L. S. Kerr (Dept. of Food Science, North Carolina State University, Raleigh, NC 27607)
Journal of Milk and Food Technology 35, No. 11, 664-668 (Nov. 1972)

A characteristic of the shellfish industry is the large number of relatively small operations. In such establishments objective methods that are rapid, inexpensive, and simple for determining the organoleptic and bacteriological qualities of shellfish would be valuable. The resazurin reduction technique has been used as a rapid, objective test of milk quality by the dairy industry (A.P.H.A., Standard Methods for the Examination of Dairy Products. 12th ed., American Public Health Association, New York, 1967, p. 136.) [In the presence of the number of mastitis organisms in milk that is 24 hr. old, a blue dyestuff, "Diazoresorcinol" as the indicator in the resazurin test is reduced to red resorufin and, eventually, to colorless dihydroresorufin.] Results of preliminary work by the authors indicated that scallop meat spoilage rate and resazurin reduction time were fairly well correlated.

In further tests to determine the applicability of the resazurin test to the shelf-life quality of scallop meat, samples were analyzed at selected intervals for total bacterial counts, resazurin reduction time, and aroma (sensory evaluation). The resazurin method of the American Public Health Association was used with slight modifications, and the Munsell system of color notation was used to determine the end point.

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7.593 DETERMINATION OF VOLATILE AMINES BY GAS CHROMATOGRAPHY: APPLICATION TO FISH

Sanchez, L. G., F. Valverde, and B. R. Pinero
Infcion Quim. analit. pura apl. Ind. 25, No. 6, 193-202 (1971) (In Spanish)
BFMIRA Abstracts 25, No. 12, Abstract No. 4176, 477 (Dec. 1972)

A method for determining the volatile amines present in cod is described and 27 amines are reported. A procedure for determining trimethylamine by referring its peak height to a calibration graph is given. R.J.D.S. Reprinted

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7.595 THE THIN-LAYER CHROMATOGRAPHIC DETECTION OF FOOD PRESERVATIVES

Lemieszek-Chodorowska, K., and A. Syncerski,
Roczn. panst. Sakl. Hig. 22, No. 4, 421-426 (1971) (In Polish)
BFMIRA Abstracts 25, No. 12, Abstract No. 4214, 485 (Dec. 1972)

The technique described can be used to detect down to 12.5 µg. of benzoic acid, 5 µg of salicylic acid, the propyl, ethyl and methyl esters of p-hydroxybenzoic acid and 2.5 µg of sorbic acid. Detailed procedures for various foods are given. Reprinted

7.86 (0.5) POLYELECTROLYTE FLOCCULATION AS AN AID TO RECOVERY OF ENTEROVIRUSES FROM OYSTERS

Kostenbader, K. D., Jr., and D. O. Cliver (Food Research Institute and Dept. of Bacteriology, University of Wisconsin, Madison, WI 53706)
Applied Microbiology 24, No. 4, 540-543 (Oct. 1972)

The procedures used to detect enteroviruses in oysters are either extremely laborious or relatively insensitive. Apparently, the oyster suspensions are toxic to the tissue cultures used to demonstrate these viruses; the suspensions must be treated intensively to reduce the toxicity or they must be diluted to minimize toxic effects. In previous work polyelectrolyte compounds (flocculation products) were tested for recovery of enteroviruses from experimentally contaminated ground beef and contaminated water. Thus, the present researchers carried out tests with two commercially available polyelectrolytes for use in flocculating solids in the recovery of enterovirus from two species of inoculated oysters. One of the two polyelectrolytes, Cat-Floc (a polydimethyldiallyl ammonium chloride; molecular weight of about 500,000), was found to be suitable.

Gulf Coast oysters, Crassostrea virginica, from Galveston Bay, United States, and English oysters, Ostrea edulis from the Tamar River, Cornwall, England, were used. The virus was injected into the digestive tract or pipetted onto the surface of the oysters; no differences in the results were noted attributable to the method of inoculation. The inoculated oyster (about 20 g.) was minced with scissors and then stirred with 100 ml. of glycine-NaOH buffer for 1 min. Two ml. of a stock solution (about 1%, w/v) of the polyelectrolyte was added and the mixture

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7.599 GAS CHROMATOGRAPHIC DETERMINATION OF VOLATILE NITROSAMINES IN FOODS

Essigmann, John M., and Phillip Issenberg (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Food Science 37, No. 5, 684-688 (Sept.-Oct. 1972)

Methods are given for the determination of certain volatile nitrosamines in foods. The nitrosamines were removed from foods using a distillation-extraction apparatus [S. T. Likens and G. B. Nickerson, Proc. Am. Soc. Brewing Chemists, p. 5 (1964)]; 60% of added dimethylnitrosamine and 70% of added diethylnitrosamine were recovered from 10 ng./gram aqueous solutions. Potential interferences in the gas chromatographic (GC) analysis were removed from the extract by an acid extraction step and by liquid column chromatography. Using a GC solvent stripping technique, dilute solutions of nitrosamines were analyzed directly. Detection of nitrosamines was accomplished with a Coulson electrolytic conductivity detector operated in the pyrolytic mode and with a flame ionization detector. The authors compared the sensitivities of these detectors for selected volatile alkyl and heterocyclic nitrosamines of potential significance in foods. They demonstrated the specificity of the Coulson detector for analysis of extracts of smoked fish and some processed meats. Unambiguous confirmation of identity of chromatographic peaks tentatively identified as nitrosamines is necessary. Cleanup of the concentrates from foods (consisting of extraction, liquid chromatography, or preparative GC) might be required depending upon the nature of the materials present. Apparently, a standard analytical method for all volatile nitrosamines and all foods is not yet available.
[7 figures, 1 table, 11 references] FTP

7.86 (0.5)

continuously stirred for 15 min. The floc was allowed to settle for 5 min. The entire mixture was poured through Miracloth (a commercial product) reinforced with cheesecloth, and the residual fluid was expressed by use of the plunger. The filtrate was then filtered in a Büchner funnel with vacuum; the funnel contained successive layers of Miracloth, cheesecloth, glass-fiber prefilter, and a 0.45-µm. porosity membrane filter. The preparation could be further concentrated by ultracentrifugation.

The polyelectrolyte flocculant promoted cohesion of the oyster solids and aided separation of the virus. Recovery of experimentally inoculated virus was from 80 to 100%. Quite likely, other polyelectrolytes would serve the same purpose.
[3 tables, 14 references] FTP

0.35 (0.38)

Aminopyrine was not metabolized to formaldehyde via N-demethylation after incubation with ultracentrifuge soluble fraction or microsomes; changes in pH and salinity had no effect. Neither the whole homogenate nor 9,000 g supernatant fraction of hepatopancreas could metabolize hexobarbital.

Nitroreductase activity was present in the hepatopancreas of the quahog. It was able to reduce p-nitrobenzoic acid to PABA. The reaction was maximal at 35° to 45° C. and pH 6.0; it was stimulated by flavin mononucleotide and inhibited by potassium cyanide. Nitroreductase activity was also found in mantle, gill, foot, and gonadal tissue. It was found that three times as much activity of the enzyme was present in the 105,000 g soluble fractions as in the microsomal fractions.
[7 tables, 18 references] SW

7.8 (1.84)

The results of the tests showed that bacterial counts and panel aroma scores correlated, but neither correlated with the resazurin method. Although there was little correlation between the resazurin method and the other two tests the authors believe that what little agreement existed was sufficient for in-plant testing of fresh scallop meat quality. However, on the basis of these studies they recommend that a reduction time of greater than 3 hr. be used.
[5 figures, 14 references] SW

7.8 AROMIZATION [sic] OF CANNED FISH AND APPRAISAL OF THEM BY ANALYZING THE FOOD SMELLS

Pekhov, A. V., G. I. Kas'yanov, V. Ya. Senich, B. V. Artem'ev, and N. E. Arkhiptsev (Krasnodar. NIIPP, Krasnodar, U.S.S.R.)
Chemical Abstracts 76, No. 25, 152099w (June 19, 1972)

7.87 DETECTION OF FROZEN FISH DETERIORATION BY AN ULTRAVIOLET SPECTROPHOTOMETRIC METHOD

Danopoulos, A. A., and V. L. Ninni (Athens Graduate School of Economics and Business Science, Chemistry and Technology Laboratory, 76 Patission Street, Athens, 104, Greece)
Journal of Food Science 37, No. 5, 649-651 (Sept.-Oct. 1972)

The ultraviolet light absorption of the oil from the fish Pagelus erythrinus was determined. The fish was stored at -20° C. for 6 months. The oil was extracted from the fish at periodical intervals of storage and the ultraviolet absorption of the oil was determined. Practically no change in ultraviolet absorption of the oil takes place from about 90 to 120 days of storage of the frozen fish, but afterwards ultraviolet absorption increases sharply. The fish finally become rancid in flavor and odor. The induction period in the oxidation of the oil of the frozen fish is clearly demonstrated by its ultraviolet absorption at 232 or 268 nm. The authors suggest that the ultraviolet absorption technique offers a reasonably satisfactory measure of the extent of oxidation of tissue oil in frozen fish.
[3 figures, 1 table, 10 references] FTP

8.51 (3.249) LEVEL OF FREE AMINO ACIDS IN NATURAL PRESERVES FROM PACIFIC OCEAN MACKEREL

Nasedkina, E. A., and Yu. I. Kas'yanenko (Tikhookean. Nauchno-Issled. Inst. Rybn. Khoz. Okeanol., Vladivostok, U.S.S.R.)
Chemical Abstracts 76, No. 9, 44782e (Feb. 28, 1972)

8.51 CHANGE IN FISH MUSCLE TISSUE PROTEINS (3.5) DURING PREPARATION FOR PICKLING
Lenova, A. P. (U.S.S.R.)
Chemical Abstracts 77, No. 7, 46906c (Aug. 14, 1972)

8. TABLES OF FOOD COMPOSITION: AVAILABILITY, USES, AND LIMITATIONS

Murphy, Elizabeth W., Bernice K. Watt (Nutrient Data Research Center, Consumer and Food Economics Institute, U.S. Dept. of Agriculture, Federal Center Building, Hyattsville, MD 20782), and Robert L. Rizek
Food Technology 27, No. 1, 40,42-43, 45-48, 50-51 (Jan. 1973)

This paper contains a description of tables of food composition and related publications available from the U.S. Department of Agriculture and how to obtain them. Also, an outline of the work currently being emphasized by the Nutrient Data Research Center is presented and misunderstandings regarding data in the Center's current publications are discussed. Tables of food composition properly used can be an invaluable tool; the authors hope that the information presented in this article will help food scientists increase their understanding of and widen their use of food composition tables.
[5 tables, 5 references] FTP

9.11 (0.35) NITROGEN FIXATION BY A BLUE-GREEN EPIPHYTE ON PELAGIC SARGASSUM

Carpenter, Edward J. (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 178, No. 4066, 1207-1209 (Dec. 15, 1972)

Biological nitrogen fixation undoubtedly must play a major role in the nitrogen cycle of the ocean; however, practically nothing is known of in situ bacterial nitrogen fixation in the open ocean, and only one algal genus Oscillatoria (Trichodesmium) has been reported to fix atmospheric nitrogen. This paper describes the first in situ measurements of nitrogen fixation by a heterocyst-bearing blue-green algae from the open ocean. [Heterocysts are enlarged cells that permit nitrogen fixation under aerobic conditions.] In May and July 1972, nitrogen fixation by Dichothrix fucicola (an epiphyte on pelagic Sargassum) was measured in the western Sargasso Sea and the Gulf Stream. Apparently this represents the first report of nitrogen fixation by a heterocyst-bearing blue-green alga in the open ocean, and also the first observation of nitrogen fixation in the genus Dichothrix. Cellular carbon to nitrogen ratios of the Dichothrix samples suggested that the alga was nitrogen-starved. The author suggests that nitrogen fixation may possibly affect the pelagic Sargassum community (comprising over 100 organisms) by extracellular release of combined nitrogen and uptake by Sargassum or phytoplankton (or by the grazing of herbivorous organisms on the Dichothrix). The enrichment of surface sea water with combined nitrogen from nitrogen fixation may be pronounced in dense aggregations of Sargassum (such as rafts or windrows).
[2 tables, 17 references] FTP

8.0 STRUCTURE OF SOME BIVALVE SHELL CARBONATES PREPARED BY ION-BEAM THINNING. A COMPARISON STUDY

Towe, Kenneth M., and George R. Thompson (Dep. Paleobiol., Smithsonian Inst., Washington, D.C.)
Chemical Abstracts 77, No. 15, 98517m (Oct. 9, 1972)

9.11 (8.53) FATTY ACIDS IN SURFACE PARTICULATE MATTER FROM THE NORTH ATLANTIC

Schultz, David M., and James G. Quinn (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881)
Journal of the Fisheries Research Board of Canada 29, No. 10, 1482-1486 (Oct.1972)

Earlier work has shown that the fatty acid composition of phytoplankton and zooplankton consists of polyunsaturated acids. Also, the published literature indicates that there is an enrichment of surface-active lipid materials (fatty acids and fatty alcohols) at the air-sea interface and that a high percentage of many varied unsaturated fatty acids are present in particulate matter from surface waters. Nevertheless, few data are available on the fatty acid composition of particulate matter, which is an important food source, directly and indirectly to fish and marine mammals. The fatty acid composition of open-ocean (North Atlantic) surface particulate matter was determined and the data were compared to those obtained from particulate matter in estuarine samples from Narragansett Bay, R.I.

The total fatty acids (free and esterified) in particulate matter from the open ocean ranged from about 4 to 26 µg. per liter. The particulate matter contained a high proportion of long-chain polyunsaturated acids. There was a low amount of iso and anteiso 15-carbon acids indicating little bacterial contamination of the particulate matter. The estuarine particulate matter contained only trace amounts of long-chain polyunsaturated acids and large amounts of branched chain acids.

[2 tables, 23 references] FTP

7.779 DETERMINATION OF THE PEROXIDE VALUE OF LEAN ANIMAL TISSUES

Valencia, M. E., and J. C. Sanahuja
An. Bromat. 23, No. 2, 217-224 (1971) (In Spanish)
BFMIRA Abstracts 25, No. 12, Abstract No. 4207, 483 (Dec. 1972)

9.13 COMPARISON OF THE ASSIMILATION OF DIFFERENT DIETS BY PENAEUS SETIFERUS AND P. AZTECUS

Condrey, Richard E., James G. Gosselink, and Harry J. Bennett (Louisiana State University, Baton Rouge, LA 70803)
Fishery Bulletin 70, No. 4, 1281-1292 (Oct. 1972)

In Louisiana estuaries shrimp is seasonally one of the dominant organisms and commercially the most important one. Earlier work on shrimp gut contents seemed to indicate that the organism ingests the dominant materials in the sediments. In Lake Ponchartrain other workers found that 58% of the stomach contents of adult white shrimp was unidentifiable detritus. Little is known, however, about the ability of shrimp to digest different food sources. This study concerns the assimilation by the white shrimp, Penaeus setiferus, and the brown shrimp, P. aztecus, of the organic components of four different defined diets and a natural substrate.

Juvenile penaeid shrimp showed high and comparable assimilation efficiencies (80-85%) on a variety of plant and animal diets. In general assimilation efficiencies for proteins and lipids were consistently high; for carbohydrates, low. Organic assimilation per gram organic weight of white shrimp, Penaeus setiferus, proceeded at 3.7 mg hr^{-1} on an axenic diatom and 8.4 mg hr^{-1} on an artificial diet. The assimilation efficiency was lower for shrimp feeding on the algal mat coating Spartina alterniflora than on two components of the mat.

[2 figures, 8 tables, 23 references] (Partly extracted; partly modified)

8.0 STUDIES ON CHEMICAL COMPOSITION OF CUTTLEFISH (SEPIA SP.) MEAT AS RELATED TO ITS NUTRITIVE VALUE

Badrowski, T. et al.
Acta Ichthyologica et Piscatoria 1, 145-158 (1970)
BFMIRA Abstracts 25, No. 6, Abstract No. 2028, 411 (June 1972)

The proximate analysis and yield of cuttlefish is given. L.P. Reprinted

7.9 CULTIVATION OF GREEN ALGAE AND THEIR USE IN TOXICOLOGICAL EXPERIMENTS (9.19)(6.30)

Khobot'ev, V. G., and V. I. Kapkov (Mosk. Gos. Univ., Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 9, 57193j (Aug. 28, 1972)

9.12 POST-FERTILIZATION SYNTHESIS OF POLYADENYLIC ACID IN SEA URCHIN EMBRYOS

Slater, D. W., and Isabel Slater (Cell Biology Unit, Reproduction Research Branch, National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, MD 20014), and D. Gillespie
Nature 240, No. 5380, 333-337 (Dec. 8, 1972)

The authors used molecular hybridization of unlabeled cytoplasmic RNA with ^{3}H-poly(U) under stringent conditions to demonstrate that the inception of sea urchin embryogenesis is accompanied by more than a doubled net synthesis of polyadenylic acid [poly(A)]. Poly(A) is a species of RNA (ribonucleic acid) associated with metazoan genetic messages and certain viral RNAs. This work represents the first demonstration of the net synthesis of an RNA moiety in response to fertilization; further, the postfertilization synthesis of poly(A) is immune to tandem suppression of transcription and is significantly stimulated by the inhibition of protein synthesis. The results may possibly suggest that the controlled adenylation of preexisting genetic transcripts is modulated by a postfertilization transitional event other than the actual synthesis of the pertinent polymerase(s). It is interesting, the authors state, that this first demonstration of net synthesis of RNA following fertilization should implicate a species of nucleic acid believed to be regulatory rather than codogenic.
[5 figures, 2 tables, 58 references] FTP

9.12 PROTEASE ACTIVITY ESTABLISHES THE BLOCK AGAINST POLYSPERMY IN SEA URCHIN EGGS

Vacquier, Victor D., Mia J. Tegner, and David Epel (Marine Biology Research Division, Scripps Institution of Oceanography, La Jolla, CA 92037)
Nature 240, No. 5380, 352-353 (Dec. 8, 1972)

Sea urchin eggs, on fertilization, release soluble macromolecules (referred to collectively as the fertilization product). In an earlier report, V. Vacquier, D. Epel, and L. Douglas [Nature 237, 34 (1972)] described a trypsinlike activity in the fertilization product. This trypsinlike activity released by sea urchin eggs at fertilization appears to have at least two functions. The first function involves the elevation of the vitelline layer away from the egg surface; the second, involves the detachment of supernumerary sperm from protease sensitive sperm attachment sites. Polyspermy is increased if the eggs are fertilized in the presence of inhibitors (for example, soybean trypsin) of the protease. Thus, this protease activity may prevent polyspermy by destroying the attachment sites of the nonfertilizing sperm.
[1 figure, 2 tables, 10 references] FTP

9.14 (1.120) (1.0161) COMPARATIVE STUDY OF FOOD OF SKIPJACK AND YELLOWFIN TUNAS OFF THE COAST OF WEST AFRICA

Dragovich, Alexander, and Thomas Potthoff (National Marine Fisheries Service, NOAA, Southeast Fisheries Center, Miami Laboratory, 75 Virginia Beach Drive, Miami, FL 33149)
Fishery Bulletin 70, No. 4, 1087-1110 (Oct. 1972)

The principal surface tuna fishery in the tropical Atlantic Ocean is located off the coast of West Africa. One of the major tasks of the Southeast Fisheries Center, Miami Laboratory, has been the study of the biology and ecology of tunas and tunalike fishes in the tropical Atlantic Ocean. In view of the recognized importance of food as an ecological factor in the life history of tunas, one project of this investigation consisted of a study of the food and feeding habits of skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) tunas--the two predominant species in commercial catches in those waters.

[The authors] describe and compare the food of skipjack and yellwfin tunas and discuss the relative importance of different forage organisms. [They] compare [their] findings with those of other investigators working in the same general area. This information may be used to study the relationship between the distribution of food organisms and occurrence of tuna schools.

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9.15 MERCURY CONCENTRATIONS IN RECENT AND NINETY-YEAR-OLD BENTHOPELAGIC FISH

Barber, Richard T., Aiyasami Vijayakumar (Duke University Marine Laboratory, Beaufort, NC 28516), and Ford A. Cross (Atlantic Estuarine Fisheries Center, National Marine Fisheries Service, NOAA, Beaufort, NC 28516)
Science 178, No. 4061, 636-639 (Nov. 10, 1972)

Pollution of the oceans through agricultural and industrial activities is of growing concern. Interest has been especially aroused in regard to mercury (Hg) uptake by organisms in the oceans. The authors examined bottom dwelling fish tissue for mercury to determine the extent of this element in organisms of the ocean depths.

An otter trawl was used to collect a variety of large fish from a depth of 2,500 m. Two trawls were made southeast of Cape Hatteras at this depth for 2 hr. over a distance of 5.5 km. The catch consisted of five species of "benthopelagic" fish including: Aldrovandia macrochir, Antimora rostrata, Bathysaurus agassizi, Chalinura brevibarbis, and C. carapina. Axial muscle was removed in a block from the mid-dorsal region.

Samples of muscle were digested by a mixture of nitric and sulfuric acids followed by permanganate and persulfate oxidation, followed by stannous chloride reduction. Measurement of Hg was made on a flameless atomic absorption analyzer.

Mercury in A. macrochir muscle ranged between 0.03 and 0.08 p.p.m.; A. rostrata, 0.24 to 0.76 p.p.m.; B. agassizi, 0.36; C. brevibarbis, 0.38 to 0.42 p.p.m.; C. carapina, 0.36 p.p.m.; A. rostrata (taken in 1883), 0.50 p.p.m.; and A. macrochir

(over)

9.19 THE ENVIRONMENTAL MERCURY PROBLEM

D'Itri, Frank M. (Institute of Water Research, Michigan State University, East Lansing, MI 48823)
Published by the Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, OH 44128 (1972), 124 pp. Price not given.

This book provides an extensive background on mercury and its relation to the environment. The use of mercury from ancient times to the present is given. Background concentrations of mercury in nature exist in ores, rocks, soils, as well as glacial materials, air, and volcanic exhalations. Fossil fuels and natural waters also contain mercury. Twelve industries are listed which use mercury: Its use in electrical apparatus is first, 26.0%; chemical applications are second, 23.1%; agriculture, 6th place, 4.6%; general laboratory use, 2.6%; and paper and pulp, a low, 0.6%. Four and one-half pages are filled with the trade names and active mercury ingredients of mercury-containing pesticides. Analytical methods are given for determining mercury content in water, soil, air, sediment, and biological materials. Movement of mercury through the food chain is listed in detail: fish, meat, grains, flour, bread, beverages (beer), vegetables, baby food, plants, and animals. Biological methylation of mercury with a cycle of mercury interconversions in nature is shown. The effect of heat in increasing biological magnification of mercury in the environment is described. Planning for decontamination and restoration of polluted areas by binding mercury to inorganic and organic materials, the author suggests, should receive high priority. Epidemiology and toxicology of mercury poisoning with case histories is given.
[554 references] SW

9.15

(taken in 1886), 0.11 p.p.m. The feeding behavior and food eaten appears to be the same for all fish observed. The authors suggest that the differences of Hg concentration among the fish genera taken must be due to species specific metabolism.

The recently caught and museum specimen A. macrochir had Hg concentrations that were close to each other and lower than the other recently caught fish. The Antimora museum and freshly caught specimens had Hg concentrations that were close to each other. The authors believe the evidence indicates that there has not been a change in Hg concentration in these fish during the last century. Furthermore, they believe that Hg values exceeding 0.5 p.p.m. are to be expected in the larger individuals of certain species, and are not related to "anthropogenic" (man originated) inputs of Hg to the oceans.
[1 figure, 1 table, 18 references] SW

9.12 PROLACTIN AND OSMOREGULATION IN FISHES

Ensor, D. M., and J. N. Ball (Dept. of Zoology, The University, Liverpool, L69 3BX; and Dept. of Zoology, The University, Sheffield, S10 2TN, United Kingdom)
Federation Proceedings 31, No. 6, Part I, 1615-1623 (Nov.-Dec. 1972)

The authors review earlier work on endocrine control of osmoregulation in fishes and discuss ways in which prolactin affects osmoregulation in teleosts and the evidence for endogenous prolactin secretion and its physiological role in teleosts. Prolactin is a hormone controlling osmoregulation in hypotonic media; it is secreted at a high rate in fresh water but at a very low rate in sea water. Although little is known about prolactin in marine elasmobranchs, it appears to have a possible role in controlling water permeability. No physiological data are available concerning prolactin in other fishes.
[4 tables, 93 references] FTP

9.14 (1.120)(1.061)

Stomach contents of 711 skipjack tuna (Katsuwonus pelamis) and 132 yellowfin tuna (Thunnus albacares) captured in 1968 by live bait and trolling off the coast of West Africa were examined. A marked taxonomic similarity was noted between the organisms in the diets of the two tunas. Frequency of occurrence, displacement volume, and numbers of each food item identified are presented for each species of tuna. Fishes, mollusks, and crustaceans were the principal foods with fishes generally dominant. The most prominent fish families were Acanthuridae, Carangidae, Dactylopteridae, Gempylidae, Gonostomatidae, Lutjanidae, Mullidae, Priacanthidae, Scombridae, Serranidae, and Trichiuridae; mollusks were chiefly cephalopods (squids), and crustaceans consisted mostly of macrozooplankton. Juvenile tunas were present in the diet of both species of tunas.
[5 figures, 4 tables, 21 references, appendix]
(Partly extracted; partly modified)

9.19 RAPID METHOD FOR DETERMINING THE REVERSIBILITY OF FISH POISONINGS

Luk'yanenko, V. I. (Tsentr. Nauchno-Issled. Inst. Osetrovogo Rybn Khoz., Astrakhan, U.S.S.R.)
Chemical Abstracts 77, No. 9, 57248f (Aug. 28, 1972)

9.12 RADIOACTIVITY IN JUVENILE COLUMBIA RIVER SALMON. (9.19) MODEL TO INTERPRET MOVEMENT AND FEEDING HABITS

Romberg, Gerald P., and William C. Renfro (Dep. Oceanography, Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98390q (Oct. 9, 1972)

9.14 EFFECTS OF DIETARY LIPIDS AND LIPID-TEMPERATURE INTERACTIONS ON GROWTH, FOOD CONVERSION, PERCENT LIPID AND FATTY ACID COMPOSITION OF CHANNEL CATFISH

Stickney, Robert R. (Florida State Univ., Tallahassee, Fla.)
Chemical Abstracts 77, No. 15, 99978z (Oct. 9, 1972)

9.16 PRELIMINARY EXAMINATION OF TWO ENVIRONMENTAL CONTROL METHODS, REDUCED SALINITY AND LIGHT DEPRIVATION, FOR THE TUNICATE BOTRYLLUS SCHLOSSERI IN AQUACULTURE SYSTEMS

Perschbacher, Peter W.
In Oceanography Field Practicum 1972, Technical Report No. 33, MICHU-SG-72-215, pp. 149-160 (Aug. 1972) (University of Michigan, Sea Grant Program)
Edward C. Monahan, and G. Thomas Kaye (Dept. of Meteorology and Oceanography, College of Engineering, University of Michigan) (compilers)

In an aquaculture project incoming sea water is filtered to prevent entry of fouling organisms with the exception of the colonial tunicate B. schlosseri. The organism is undesirable because of its rapid summer growth by asexual budding which may result in a mat of contiguous colonies over 1 ft. in diameter. This overgrowth adversely affects coastal oyster culture and aquaculture systems.

Experiments were performed to examine several environmental methods for control of the organism in aquaculture systems. Variations in salinity and temperature were used to determine the lethal level. Slides with five colonies on each were immersed in two groups of vessels containing 20, 15, 10, 5 ‰ salinities, and fresh water at 22° and 16.5° C., respectively. At intervals of 5, 15, 30, 60, and 90 min., a slide was removed from each vessel and returned to environmental salinity, (31 ‰). A count to determine mortality was made several days later. Mortality was determined by evidence of decomposition, a red-orange appearance of the organisms.

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9.16 (1.32) FRAZER LAKE SOCKEYE INVESTIGATIONS, 1970

Russell, Philip A. (Division of Commercial Fisheries, Anchorage, Alaska)
Information Leaflet No. 159, 83 pp. (Sept. 1972) (State of Alaska, Dept. of Fish and Game, Support Building, Juneau, AK 99801)

Frazer Lake, located on Kodiak Island, is 8 miles long and 1 mile wide. Drainage from the lake is via the Frazer River. Ten of the tributary streams entering Frazer Lake provide about 1 million sq. ft. of potential spawning area for sockeye salmon. A 30-ft. falls ½ mile below the lake outlet blocked migration into the lake.

From 1951 to 1956, about 2,600,000 green sockeye eggs were planted in the Frazer Lake system. The first progeny returned in 1956. After 1962, returning spawners entered the system through a fish pass around the falls. A total of 98,860 adults have used the fish pass as of 1970. The return of spawners has increased through the years. The escapement for 1970 was 7,331 fish greater, due to an increased return and improved fish passage, than any previous year.

The age composition of smolt in 1970, as determined by scale analysis combined with the aid of length frequency, was 0.3% age 3.0, 31.6% age 2.0, 68.1% age 1.0, and 0.02% age 0.0. Age 0.0 smolt averaged 113 mm. in length and 12 g.; age 1.0 smolt 149 mm. and 31 g.; age 2.0 smolt 180 mm. and 54 g.; and age 3.0 smolt 193 mm. and 64 g. Fresh-water survival rate from potential egg deposition to smolt is about 0.70%. Relatively good agreement between length frequency groupings and scale analysis age groups indicates age determinations were reasonably accurate.

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9.16 THE CAGE CULTURE OF SOME MARINE FISHES IN THE INTAKE AND DISCHARGE CANALS OF A STEAM-ELECTRIC GENERATING STATION, GALVESTON BAY, TEXAS

Marcello, Rocco Anthony, Jr., and R. Kirk Strawn (Dept. of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77840)
Texas A&M University Sea Grant Publication No. TAMU-SG-72-206, xxvi + 267 pp. (Sept 1972) (Texas A&M University, Sea Grant Program, College Station, TX 77840)

The demand for fishery products has been steadily increasing in the United States and around the world. Since the commercial fishing industry cannot meet this demand, fish farming has been advocated as a supplementary measure. Although fish farming has its merits, there are some limiting factors. The primary one is that some fish cannot be grown to marketable size in one growing season, therefore, they must be wintered. To protect against large mortalities due to low winter temperatures, utilization of thermal discharges from electric generating stations has been suggested. This study was undertaken to determine the feasibility of this suggestion.

Several species of marine fishes, croaker (Micropogon undulatus), pinfish (Lagodon rhomboides), pompano (Trachinotus carolinus), white mullet (Mugil curema), pigfish (Orthopristis chrysoptera), Gulf kingfish (Menticirrhus littoralis), silver perch (Bairdiella chrysura), spot (Leiostomus xanthurus), and black drum (Pogonias cromis), were placed in cages in the intake canal, and croaker, pinfish, and pompano were placed in cages in the discharge canal of a steam-electric generating station on Galveston Bay, Tex., for determination of survival, food conversion, length-weight relationship, condition, and growth. Approximately 25 fish were placed in each of 45 cages, 30 cages in the intake canal and 15 cages in the discharge canal. Survival, feeding, food conversion, length-weight relationship

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9.16 GROWTH AND FOOD CONVERSION OF RAINBOW TROUT REARED IN BRACKISH AND FRESH WATER

Murai, Takashi, and James W. Andrews (Skidaway Institute of Oceanography, 55 West Bluff Road, Savannah, GA 31406)
Fishery Bulletin 70, No. 4, 1293-1295 (Oct. 1972)

Although brackish water culture of rainbow trout (Salmo gairdneri Richardson) has been practiced in other countries for years, few attempts have been made to culture this euryhaline species in brackish water in the United States. This work was designed to study the growth, food conversion, and survival rates of rainbow trout reared from fingerling to market size in brackish and fresh water.

Six 1.8-m diameter ground fiber glass tanks with a water depth of 0.6 m were used as experimental culture tanks. Fresh water from a deep well (22° C) or brackish water (25-30 ‰) from the Skidaway River, Savannah, Ga., was pumped into each tank through flow control nozzles at a rate of 19 liters/min (1.3 hr/exchange). Water temperatures were not controlled. Four experimental tanks were stocked with rainbow trout averaging 60 g each at an initial density of 7.2 kg fish/m^3, and two were stocked at a density of 14.4 kg fish/m^3. Fish in two of the tanks containing 7.2 kg/m^3 and the tanks containing 14.4 kg/m^3 were acclimated to brackish water by gradually changing the fresh to brackish water ratio of incoming water. Each group was fed a commercial pelleted trout feed twice daily. The entire population of each tank was weighed and counted monthly. Temperatures, ammonia, salinity, and dissolved oxygen levels were determined biweekly. Ammonia levels were below 0.3 p.p.m. and oxygen concentrations were above 7.0 p.p.m. throughout the experimental period. After 16 weeks, the experiment was terminated.

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and condition, and growth records were maintained for all species being cultured. A record of the hydrological data at the culture sites was also maintained.

Each cage was 3 x 4 x 3 ft., constructed of 1 x 1/8-in. angle iron and 1/2 x 1-in. mesh galvanized welded wire (16 gauge), dip-treated to prevent corrosion, and had polystyrene flotation blocks attached lengthwise on two sides. A feeding ring 12 x 18 x 24 in. constructed of 1/8-in. mesh galvanized hardware cloth with top and bottom open was inserted in the top of each cage so that 20 in. of it extended into the cage interior.

All fish were fed pelleted Purina Trout Chow daily, six times per week: pompano at about 5% of their total weight in a cage, all other species at about 3% of their total weight in a cage. After placing food in the feeding ring, the cage was tapped several times to notify the fish of its presence. Croaker, pinfish, pompano, white mullet, spot, and black drum cultured in the intake canal had a survival rate of 70%. Survival in the discharge canal was extremely poor, with an almost complete mortality of croaker and pompano. The mortality was attributed to gas-bubble disease. Although only preliminary data were obtained, using heated discharge to extend the growing season of fish during periods of low-water temperature is promising and deserves further study. Food conversion efficiency was greatest in the croaker and less than acceptable in all other species studied. Generally speaking, the length-weight relationship for almost all species studied were greater than those for naturally occurring fish. In almost every case, cage-cultured fish were heavier per any given length.

Growth of all species of cultured fish was at least equal to, if not greater than, naturally occurring fish. Growth was slowed considerably during the winter months for the fish in the intake canal. The few surviving fish in the discharge canal (receiving the heated water) exhibited normal growth throughout the year.
[28 figures, 52 tables, 91 references, 38 appendix tables] Lee Thorson

The results showed that:

1. Rainbow trout were converted from fresh to 30‰ salinity in a period of 9 days and were reared to market size at this salinity.
2. Trout fingerlings averaging 60 g each were reared to 266 g in 21° C fresh water with a rapid individual growth rate and an acceptable survival and food conversion rate.
3. Survival and growth rates and food efficiencies were excellent for trout reared in brackish water at an average temperature of 13.5° C.

[2 figures, 1 table, 8 references] (Partly extracted; partly abstracted)

9.16 MIXED FEEDS FOR TROUT IN NET CAGES

Tiews, J., J. Gropp, H. Koops, and K. Tiews (Tieraerztl. Fak., Univ. Muenchen, Munich, Germany)
Chemical Abstracts 77, No. 13, 86901u (Sept. 25, 1972)

Results of these tests showed that the lethal level at 22° C. is 30 min. in fresh water and 60 min. in water of 5 ‰ salinity. At 16.5° C., there was 100% mortality in fresh water in 30 min. and no mortality in water of 5 ‰ salinity. In tests at 6.5° C. in various salinities, no mortality was found in fresh water. Prolonged tests in water of 10 ‰, 15 ‰, and 20 ‰ salinity produced 10% mortality in 10 ‰ salinity at 36 hr. and no mortality after 1 week for organisms in 15 ‰ and 20 ‰ salinity. Organisms adapted to light deprivation and subjected to the same tests reacted in the same manner as organisms that were not deprived of light. The lethal levels for B. schlosseri at 22° and 16.5° C. in fresh water and 5 ‰ salinity are well within the tolerance limits of oysters and most bivalves. Oysters or other cultured bivalves infested with the organism can be flushed with fresh water at temperatures of 20° and over. Oysters will survive in fresh water for 3 days with zero mortality. Draining the pond or impoundment and refilling with fresh water would constitute flushing.
[3 tables, 13 references] SW

Since 1956, the number of adult sockeye entering Frazer Lake has increased with a peak return of 24,081 in 1970. The majority of adults entering the Frazer system were age 2.2. An increase in sockeye spawner survival occurred in 1970 as a result of improved fish pass efficiency.

Temperature profiles taken at Frazer Lake from 1965-1968 and 1970 show similarities to river temperature data. The copepod (tiny crustaceans) concentration of the zooplankton in the lake system has remained fairly constant, while the populations of rotifers (microscopic wormlike animals) and cladocerans (tiny crustaceans) have been increasing since 1965. SW

9.19 CLOSED WATER CIRCULATION IN USED PAPER-PROCESSING PAPER MANUFACTURE

Brecht, Walter, and Hans Lutz Dalpke (Inst. Papierfabr., Tech. Hochsch., Darmstadt Germany)
Chemical Abstracts 77, No. 24, 154168n (Dec. 11, 1972)

9.17 (9.3) THE PLIGHT OF OCEAN MAMMALS

Herrington, Alice (Friends of Animals, Inc.), and Lewis Regenstein (Committee on Humane Legislation, Inc., Washington, D.C.)
Environmental Affairs 1, No. 4, 792-825 (Mar. 1972)

The nature of the problem relative to the destruction of the ocean mammals (seals, sea otters, whales, and polar bears) are described and discussed. The authors believe that protective legislation for these ocean mammals must state three principles: (1) a total ban on the importation into the United States of all products, raw or finished, from any ocean mammal, (2) a ban on Americans' killing ocean mammals anywhere in the world, and (3) a mandate to the State Department to vigorously negotiate a truly international treaty for a halt to the slaughter of ocean mammals.'
[161 footnotes]

FTP

9.19 (0.35) EFFECTS OF TRISODIUM NITRILOTRIACETATE, TRISODIUM CITRATE AND A TRISODIUM NITRILOTRIACETATE-FERRIC CHLORIDE MIXTURE ON CADMIUM AND METHYL MERCURY TOXICITY AND TERATOGENESIS IN RATS

Nolen, G. A., R. L. Bohne, and E. V. Buehler (Procter and Gamble Co., Miami Valley Laboratories, P.O. Box 39175, Cincinnati, OH 45239)
Toxicology and Applied Pharmacology 23, No. 2, 238-250 (Oct. 1972)

In another study, reported on pages 222-237 of the same issue of this journal, the effects of various levels of cadmium chloride or methyl mercury chloride and trisodium nitrilotriacetate (Na_3NTA) (in combination) on pregnant rats and fetal development were examined. It is known that Na_3NTA will bind to Fe^{3+} and other cations in preference to Cd or Hg. Therefore, the present study was carried out to determine the effects of the widely prevalent cation Fe^{3+} on the toxicity and teratogenicity of Hg- or Cd-Na_3NTA mixtures. Also, the effects of trisodium citrate dihydrate, a ubiquitous natural chelator, was compared with those of Na_3NTA on the induction of methyl-Hg or Cd toxicity and teratogenicity.

Groups of pregnant rats were fed 4 mg./kg. of either Cd (as $CdCl_2$) or Hg (as CH_3HgCl) with 20 mg./kg. of either Na_3NTA, or Na_3-citrate, or Na_3NTA plus 7 mg./kg. of $FeCl_3$ per day from days 6 to 15 of gestation. The compounds were administered in distilled and deionized drinking water.

The results of the study (and those of the previous study) showed that Na_3NTA had no effect on the maternal toxicity or teratogenicity of $CdCl_2$ or CH_3HgCl, even

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9.19 (0.35) EFFECTS OF TRISODIUM NITRILOTRIACETATE ON CADMIUM AND METHYL MERCURY TOXICITY AND TERATOGENICITY IN RATS

Nolen, G. A. (Procter and Gamble Co., Miami Valley Laboratories, Cincinnati, OH 45239), E. V. Buehler, R. G. Geil, and E. I. Goldenthal
Toxicology and Applied Pharmacology 23, No. 2, 222-237 (Oct. 1972)

Trisodium nitrilotriacetate (Na_3NTA) has been proposed as a partial replacement for sodium tripolyphosphate in detergents (to reduce the phosphate levels in rivers and lakes). Earlier work has shown Na_3NTA to be as nontoxic as the phosphate builders and to be neither embryotoxic nor teratogenic, even at exaggerated levels, in rabbits and rats. However, certain researchers reported that Na_3NTA enhanced the teratogenicity and lethality of $CdCl_2$ in rats and mice when administered subcutaneously and of CH_3HgCl when administered orally. The present study examines the effects of various levels of either methyl mercury chloride or cadmium chloride and Na_3NTA (in several combinations) on pregnant rats and fetal development.

Groups of mated female rats were given doses of Na_3NTA alone or Na_3NTA with $CdCl_2$ or CH_3HgCl in their drinking water during organogenesis. Cadmium (as $CdCl_2$) was fed at levels of 0, 0.01, 1, and 4 mg./kg. Mercury (as CH_3HgCl) was fed at levels of 0, 0.02, 0.2, and 4 mg./kg. Na_3NTA was administered at 0, 0.1, or 20 mg./kg. at each level of metal fed.

Cadmium at the 0.01 and 1 mg./kg. levels had no effect on the dams; the 4 mg./kg. level reduced the weight gains of the animals. Cadmium at the 1 and 4

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9.19 (1.93) MARINE TURTLE NESTING ON HUTCHINSON ISLAND, FLORIDA IN 1971

Gallagher, Robert M., Malcolm L. Hollinger, Robert M. Ingle, and Charles R. Futch
Special Scientific Report No. 37, Florida Department of Natural Resources, Marine Research Laboratory, St. Petersburg, Fla. (July 1972), 11 pp.

An 890-megawatt steam-generating nuclear power plant being built on Hutchinson Island, Fla., is expected to be operating in 1974. Baseline data were collected for comparison with conditions after the plant is placed in service. A part of the study was a survey of the nesting sea turtle populations on Hutchinson Island.

Earlier reports indicated that Hutchinson Island beaches are an important nesting area for the Atlantic loggerhead turtle, Caretta caretta caretta (Linnaeus), the Atlantic green turtle, Chelonia mydas mydas (L.), and the leatherback turtle, Dermochelys coriacea coriacea (L.).

This study was performed to estimate total nesting of loggerhead turtles and predation rates upon eggs. In addition, exact numbers of nesting green and leatherback turtles were determined.

Atlantic loggerhead turtle nesting was first noted May 7, peaked during the first week of July, and continued through September 10. A total of 1,420 nests were recorded in this period. Of the observed nests, 44% occurred during a 4-week period ending July 10. Raccoons destroyed 28% of the nests. Total egg production was estimated at 402,000. Seven tagged turtles built two nests each. Time intervals between nestings ranged from 14 to 55 days. The distance between nesting crawls ranged from 0.5 to 13.5 miles.

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9.19 (0.35)

mg./kg. levels increased the number of defective fetuses; no significant embryotoxicity was produced. The Na_3NTA produced no significant effect at any of the levels of cadmium. Mercury at the 0.02 and 0.2 mg./kg. levels had no effect on the dams; mercury at the 4 mg./kg. level reduced the weight gains of the animals. A significant number of abnormal fetuses increased as the level of Hg fed increased, but the presence of Na_3NTA produced no significant change.

The authors concluded that Na_3NTA did not enhance the toxicity or teratogenicity of $CdCl_2$ or CH_3HgCl.

[11 tables, 15 references] FTP

9.19 (1.93)

Twenty-two Atlantic green turtle nests were found on two sections of beach, between June 26 and August 30. An estimated 8 to 10 individuals produced about 2,948 eggs.

Six leatherback turtle nests were found from May 17 to June 30.

[4 figures, 2 tables, 12 references] SW

9.19 (0.35)

at exaggerated levels. The present study indicated further that the effects of trisodium citrate were not significantly different from those of Na_3NTA. The Fe^{3+} gave some protection against methyl-Hg induced teratogenicity, which the authors believe was not influenced by the presence of Na_3NTA. In conclusion, the results of this study confirm that Na_3NTA does not enhance the teratogenesis of cadmium or of methyl-Hg.

[7 tables, 9 references] FTP

9.19 MERCURY POLLUTION AND LAKE ERIE FISHES

Annett, C. S., M. P. Fadow, F. M. D'Itri, and M. E. Stephenson (Michigan State Univ., East Lansing, Mich.)
Chemical Abstracts 77, No. 7, 46896q (Aug. 14, 1972)

Data on the distribution of mercury in the organs of three tuna species (Yellowfin, Bigeye and Skipjack) and the relation between mercury content and body weight were obtained. C.C. Reprinted

9.19 INVESTIGATIONS ON THE OCCURRENCE OF MERCURY IN TUNA (1.12)

Pirati, D., et al.
Industria Conserve 47, No. 1, 11-15 (1972) (In Italian)
BFMIRA Abstracts 25, No. 12, Abstract No. 4373, 523 (Dec. 1972)

9.19 REMOVAL OF MERCURY FROM INDUSTRIAL WASTES

Oehme, Christian, Hans Rudolf Brost, and Heiko Hoffmann (Farbenfabriken Bayer A.-G.) (pat.)
German Offen. (Patent) 2,110,057 (Sept. 7, 1972)
Chemical Abstracts 77, No. 24, 156143z (Dec. 11, 1972)

9.17 REGULATED STREAM DISCHARGE FOR FISH AND OTHER AQUATIC RESOURCES -- AN ANNOTATED BIBLIOGRAPHY

Fraser, J. C. (Environment Protection Authority, Victoria, Australia)
FAO Fisheries Technical Paper No. 112, 103 pp. (Sept. 1972) (Food and Agriculture Organization of the United Nations, Rome, Italy) (Distribution restricted)

This bibliography is a list of abstracts and references of readily available literature relative to the problem area of how to establish or select adequate minimum flows in streams which have been brought under complete or partial control by dams or diversions. FTP

9.19 GROWTH OF CHLAMYDOMONAS IN A MEDIUM CONTAINING MERCURY

Ben-Bassat, David, Gedalia Shelef, Nachman Gruner, and Hillel I. Shuval (Hebrew University--Hadassah Medical School, Dept. of Medical Ecology, Environmental Health Laboratory, Jerusalem)
Nature 240, No. 5375, 43-44 (Nov. 3, 1972)

The behavior of the alga Chlamydomonas grown in a medium containing mercury was studied with a view to the removal of mercury from sewage and industrial wastes by algal treatment processes.

A sterile medium containing penicillin, acetate, citrate, and minerals was provided for growth of Chlamydomonas reinhardi γ^{-1} with various concentrations of $HgCl_2$ or $^{203}HgCl_2$ (0 to 1.0 mg./l.). A mixture of air and 5% CO_2 was bubbled through the medium (sown at 80-100 cells/.001 ml., and it was exposed to continuous illumination.

Results of the tests indicated that raising the concentration of Hg from 0 to 1.0 mg./l. caused an increase in the lag period of algal growth. On a medium containing 2 mg. mercury per liter growth was completely retarded.

Tests were performed using a medium containing 0.2 mg. of $^{203}HgCl_2$/l. and a control medium containing 0.16 mg. of $^{203}HgCl_2$/l. with no algae. Cultures containing ^{203}Hg were found to behave similarly to nonradioactive Hg cultures. The mercury concentration of the whole culture (medium + cells) decreased 40% in the 8 days of the experiment as compared to a 5% decrease in the control. The change in concentration was essentially in the medium alone as only 2 to 2.5% of the

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9.19 MERCURY IN HARBOUR PORPOISES (PHOCOENA PHOCOENA) FROM THE BAY OF FUNDY REGION

Gaskin, D. E. (Dept. of Zoology, University of Guelph, Guelph, Ontario, Canada), K. Ishida, and R. Frank (Pesticide Residue Testing Laboratory, Ontario Dept. of Agriculture and Food, Guelph)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1644-1646 (Nov. 1972)

Earlier work has indicated high levels of organochlorine pesticides in harbor porpoises from the Bay of Fundy region. The present paper gives data on the mercury levels of the longissimus muscle and the liver of harbor porpoises from the Bay. Forty-one muscle and twenty liver samples were collected from harbor porpoises taken in the Bay of Fundy region during 1969 to 1971. The total mercury content of the tissues was determined.

The total mercury content of the muscle tissue ranged from 0.21 to 1.92 p.p.m. (avg. 0.75) in the males and from 0.26 to 2.58 p.p.m. (avg. 1.02) in the females. The total mercury content of the liver tissue was from 0.89 to 18.3 p.p.m. in the males and from 0.55 to 91.3 p.p.m. in the females. In the muscle (four samples were examined), the mercury was practically 100% methylated. In the liver (six samples were examined), from 7.4 to 41% of the mercury was methylated; the concentration of methylated mercury was lowest in the livers with the highest level of mercury. The mercury level of the tissues appeared to be higher in the larger (and presumably older) animals.

[2 figures, 10 references]

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9.19 THE POLYCHLOROBIPHENYLS, THEIR OCCURRENCE AND SIGNIFICANCE. A REVIEW

Edwards, R. (H. J. Heinz Co., Ltd., Hayes Park, Hayes, Middlesex, England)
Chemistry and Industry, No. 47, 1340-1348 (Nov. 20, 1972)

This article is a review of the literature concerning the polychlorobiphenyl compounds dealing with their properties and use, occurrence in the environment, toxicology, and analysis; the significance of the findings is discussed.

PCBs were recognized as far back as 1881 and were in widespread industrial use by 1930. The PCBs are complex mixtures of various compounds and isomers. Biphenyls, terphenyls, naphthalenes, and mixtures of these compounds are chlorinated to varying degrees depending upon the use to which they will be put. They are marketed under such trade names as 'Arochlor,' 'Phenochlor,' and 'Clophen.' They range from liquids to crystalline materials or hard resins. They are stable in water, acid, or alkali, and have such thermal stability that they are used as fire retardants. They are used in paints, varnishes, inks, elastomers, adhesives, putty, and general fillers.

The significance of PCBs (and pesticides) to man and other organisms must be evaluated in the context of their sublethal effects on populations over long periods of time. These influences on the population relate to the reproductive processes (reduction of fertility, delays in breeding) and to teratogenic and carcinogenic effects on the parent and later generations. From such a viewpoint, LD_{50} tests are not relevant even over a long period. Although severe liver damage and death can result to mammals from high levels of PCBs, such levels are reached only in a few food chain heads and are not the normal levels found in man. However,

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9.19 (0.6) SURVEY OF FOOD INGREDIENT-DDT REACTIONS UNDER THERMAL PROCESSING CONDITIONS

Ralls, Jack W., and Antoni Cortes (Western Research Laboratory, National Canners Association, Berkeley, CA 94710)
Journal of Food Science 37, No. 5, 760-763 (Sept.-Oct. 1972)

Earlier work by various researchers has shown that when foods containing DDT residues are processed the DDT levels may be reduced and the DDT may be transformed in part to DDD or other transformation products. [DDT is 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane; DDD is 1,1-dichloro-2,2-bis-(chlorophenyl)ethane.] The present study was carried out to determine which food components are responsible for the transformation of DDT to other compounds during heat processing. This report gives the results of studies of the changes in aqueous solutions or suspensions of DDT during heating with vitamins, amino acids, peptides, casein, yeast nucleic acid, and diphosphopyridine nucleotide. The amino acids and peptides tested were arginine, lysine, histidine, cysteine hydrochloride, glutathione, and aspartylphenylalanine methyl ester. The water-soluble vitamins tested were thiamine hydrochloride, folic acid, riboflavin, choline chloride, niacin, ascorbic acid; other chemicals consisted of ferrous sulfate, DiNa EDTA, and hydrogen peroxide. A nine component mixture tested was composed of riboflavin, thiamine hydrochloride, folic acid, yeast nucleic acid, cysteine HCl, niacin, choline chloride, ascorbic acid, and glutathione. A 5-liter flask heated by a Glascol mantle was used for the thermal reactions. Two liters of water or phosphate buffer and the food ingredient(s) were added to the flask. Two ml. of an acetone solution of

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DDT appears to have a definite 'no effect' level, but PCBs apparently do not. Furthermore, we do not know exactly what compounds are responsible for the toxicity of PCBs, but they may involve the lower chlorinated compounds and probably the oxidation products in vivo and in vitro. Also, impurities in some commercial mixtures of the PCBs are toxic, and there is the possibility of synergistic effects. Multigeneration tests involving feeding levels of the order of 1 p.p.m. over a long period are difficult to carry out. Nevertheless, the need for such tests may be related to recent tests with DDT. Despite many years of study with DDT, it was only recently found that with the original parents (mice) dosed, carcinogenic effects occurred in later generations (the sixth). In the western coastal states of the United States, genetic changes in the fruit fly population resulted from DDT spraying programs in the area; also, the genetic changes were correlated with spreads by wind over long distances. PCBs are probably spread mostly by water, and they now appear all over the continental shelves fed by industrial effluents. It is clear, the author states, that with the ubiquitous presence of the PCBs, the effects of PCBs and associated compounds must be evaluated with great thoroughness. [8 tables, 70 references] FTP

9.19 (0.6)

radioactive DDT was added to the flask; the amount of DDT added corresponded to a level of 7.0 p.p.m. The reaction mixtures were heated for 2 hr. at 100° C. Thin-layer chromatography on alumina plates was used to resolve the mixtures into regions corresponding to R_f values for five known transformation products or analogs of DDT. The quantity of each product formed was related to the radioactivity of each plate region.

DDT is relatively stable in heated water or buffer solution (0.10 mol phosphate) at pH from 3 to 8 (DDT recoveries ranged from 98 to 100%); at pH 8.1 about 4% DDE [1,1-dichloro-2,2-bis-(p-chlorophenyl)ethene] was formed. The maximum reduction in DDT content of a suspension containing DDT and a single component was 10%, and it occurred with cysteine hydrochloride. The mixture containing DDT and nine other components showed a 20% reduction in DDT content.
[1 figure, 7 tables, 8 references] FTP

9.19 EFFECTS OF DIELDRIN-CONTAMINATED FOOD ON THE DEVELOPMENT OF LEPTODIUS FLORIDANUS LARVAE

Epifanio, C. E. (Dep. Zool., Duke Univ., Durham, N.C.)
Chemical Abstracts 77, No. 11, 71085g (Sept. 11, 1972)

9.19

total culture radioactivity appeared in the cells. Mercury decrease in the medium became slower in the course of the experiment. The amount of mercury per cell decreased 90% in the same amount of time. This decrease in Hg is probably the result of its loss from the system.

It was further found that the algal cells were able to recover from the growth lag induced by Hg. During the lag, Hg concentration fell from the initial 0.2 mg./l. to 0.17 mg./l. The loss of Hg was due to the presence of the cells and the loss was particularly active in the lag period. The authors suggest that the mercury changed into a volatile form through some biological process, which allowed it to leave the system. Simultaneously, the cell affinity (or cell permeability) for mercury was reduced.
[3 figures, 5 references] Lee Thorson

9.19 POLYMERIC ADSORBENTS FOR HEAVY METALS

Oda, Nakaaki, Shozo Iwasa, Mitsuru Idohara, Yoshio Horie, Takeo Fukui, and Naomichi Takasaki (Japan Soda Co., Ltd.) (pat.)
German Offen. (Patent) 2,164,006 (July 13, 1972)
Chemical Abstracts 77, No. 18, 115337x (Oct. 30, 1972)

9.19 DISTRIBUTION OF MERCURY IN THE SEDIMENTS OF NEW HAVEN (CONN.) HARBOR

Applequist, M. D., A. Katz, and K. K. Turekian (Dept. of Geology and Geophysics, Yale University, New Haven, CT 06520)
Environmental Science & Technology 6, No. 13, 1123-1124 (Dec. 1972)

New Haven Harbor requires maintenance dredging and is subject to developmental dredging. The disposition of the dredge spoils, especially if they contain mercury and other metals, is of growing concern because of their possible toxic effects.

The authors assessed the distribution and levels of mercury in the sediments of New Haven Harbor and identified the probable sources of high concentrations where found. The results are indicated on a map of the harbor. The outfalls of the municipal sewage treatment are located on the map. Distribution of mercury in the sediments indicates that the primary supply was from these sewer outfalls. The different patterns of mercury distribution in the sediments around the outfalls was due to the local current systems.
[1 figure, 1 table, 5 references] SW

9.19 MERCURY LEVELS IN TISSUES OF DUCKS COLLECTED IN SOUTH-CENTRAL NORTH DAKOTA

Swanson, G. A., G. L. Krapu, and H. K. Nelson (North Prairie Wildlife Res. Cent., Jamestown, N.Dak.)
Chemical Abstracts 77, No. 11, 71038u (Sept. 11, 1972)

9.19 ENVIRONMENTAL TOXICOLOGY OF PESTICIDES

Matsumura, Fumio (Dept. of Entomology, University of Wisconsin, Madison, WI 53706), G. Mallory Boush, and Tomomasa Misato (Institute of Physical and Chemical Research, Wako-shi, Saitama, Japan) (editors)
Published by Academic Press, Inc., 111 Fifth Avenue, New York, NY 10003 (1972), i-xiv + 637 pp. Price not given.

The problems of environmental contamination by pesticides are the result of modern industrialization, urbanization, and highly developed agricultural practices. The editors compiled this book from a collection of papers presented at a seminar held in Oiso, Japan, October 1971, on the state of knowledge in the major pesticidal areas. It describes the efforts and approaches to solving or understanding these problems. The 48 contributors to the book are from Japan, the United States, Britain, and Canada. The major topics are as follows:

Part I. "Patterns of Pesticide Usage and Occurrence of Residues,"
Part II. "Mercury Transformation in the Environment,"
Part III. "Chlorinated Hydrocarbon Insecticides in the Environment,"
Part IV. "Fungicides, Herbicides, Organophosphates, and Carbamates,"
Part V. "Microbial Influence on Pesticide Degradation,"
Part VI. "Photodecomposition of Pesticides,"
Part VII. "Toxic Effect of Pesticide Residues on Wildlife," and
Part VIII. "Design of New Pesticides."

SW

9.2 TOWARD A SCIENCE OF SOCIAL FORECASTING

Meadows, Dennis L. (Thayer School of Engineering, Dartmouth College, Hanover, NH 03755)
Proceedings of the National Academy of Sciences of the United States of America 69, No. 12, 3828-3831 (Dec. 1972)

The United States is searching for improved policies of energy production, population growth, rural development, income distribution, foreign relations, and other important social areas. Decades will be required to develop such policies and to implement them, many more to assess their consequences, and still many more to process any revisions that may be necessary. Nevertheless, our political and economic institutions which make most social choices are structured to give little weight to the consequences of their actions more than a few years in the future. Most of our society's actions are based implicitly upon a concern for only the next 5 to 10 years. In this article, the author (1) explains the cause for concern over the lack of adquate long-range social forecasting methods, (2) indicates several minimum requirements for the new forecasting techniques we need, and (3) points to some of the unanswered questions about the mechanics and the ethics of the process through which formal models of social systems are used to influence the development of social policy.

The human socioeconomic system displays three dynamic characteristics that are also true for each individual nation. These are (1) Most physical attributes of the global system are characterized by exponential growth (population, mineral resource consumption, pollution generation, and food production are examples). (2) The earth's finite supply of resources and the finite capacity of the ecosystem

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9.2 EXTENDED RESULTS ON OPTIMAL INVESTMENT STRATEGIES IN SHRIMP FISHING

Sielken, R. L., Jr. (Texas A&M University), R. G. Thompson (Dept. of Quantitative Management Science, University of Houston), and R. R. Wilson (Economic Research Laboratory, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce)
Report No. TAMU-SG-72-211, 27 pp. (Dec. 1972) (Texas A&M University, Sea Grant Program)

The first of three earlier reports [TAMU-SG-70-205 (Apr. 1970)] defined a deterministic (choices based on past performance) optimum control model of a shrimp fishing firm. This model was extended in a second report [TAMU-SG-70-218 (July 1970)] by incorporating, unknown but random, future shrimp catches and prices and a constraint that required solvency to be maintained. In a third report [TAMU-SG-71-101 (Dec. 1970)], the model was extended to require the purchase of integer numbers of vessels (as distinguished from fractional vessels) in relation to capital indivisibilities. This report considers the model described in the third report but extends the numerical examples to include alternative sizes of boats.

The model is the basis of a method of obtaining optimal investment strategies for shrimp fishermen. Parameters and variables which characterize the business environment in which the shrimp fishing firm is operating, such as indebtedness and price of shrimp, are given values in equations which can be solved by any of the commercial mixed integer programming computer programs.

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9.2 (0.6) BALANCE COST, TIMING TO REDUCE RISK OF NEW PRODUCT FAILURE

Rosenfeld, Samuel L. (New Products, Chesebrough-Ponds Inc., Greenwich, Conn.)
Food Product Development 6, No. 8, 31 (Dec.-Jan. 1973)

This article was adapted from a presentation by the author before the 20th Annual Marketing Conference, The Conference Board, New York, October 11, 1972. When dealing with the marketing of new consumer packaged goods, gaining time, momentum, and initiative over competition can be more significant than minimizing money risks. This fact should be kept in mind when balancing cost against gaining increased certainty. The time and cost involved in the evolution of a new product increases in progressive steps as shown in the following table:

Step	Money expended	Elapsed time
	$	Months
Screening	<1,000	<1
Evaluation	<10,000	1 to 3
Development	<100,000	3 to 18, or longer
Marketing	<100,000	6 to 12

The screening phase should involve little cost and risk. Evaluation involves development of a prototype, and the amount of time and money needed is not great. The development and marketing phases require substantially greater expenditures of time and money; the marketing phase involves the greatest risk. The table that follows shows various alternatives for decreasing the risk of new product failures.

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9.2

Three numerical examples are given to illustrate how a shrimp fisherman having a given amount of physical and money capital can use the model to obtain guide lines for investment and financial decision-making. The authors believe that computer costs to an individual seeking such guide lines should generally be less than $25 per year.
[8 tables, 3 references] SW

9.2 COST, TIME, AND PESTICIDE SAFETY (9.19)

Johnson, Julius E., and Etcyl H. Blair (Dow Chemical Co., Midland, MI 48640)
Chemical Technology (CHEMTECH) 2, No. 11, 666-669 (Nov. 1972)

The authors discuss examples of how research and development (R&D) efficiency, time, and cost are all associated in the successful commercialization of a new agricultural pesticide. The cost of developing a new agricultural chemical in 1956 was $1,196,000; by 1964, the cost more than doubled; and by 1969, the cost tripled. These values do not reflect costs of pilot plants, process development, and other activities such as waste control and environmental factors. Today, one new pesticide emerges for every 10,000 compounds tested; the time from discovery to market is 8 to 10 years; and the cost is in excess of 10 million dollars. Figures given in the report depict pesticide research and development costs, safety evaluation--minimum registration requirements, expenditure program--eight typical R&D projects, and projected technical manpower for safety R&D in 1970 for agricultural chemicals.
[8 figures] FTP

9.2 (0.6)

Item	Cost	Advantage or opportunity involved	Problems involved
	$		
Computer simulation	>10,000	Include many variables, check many alternatives	Missing answers to some steps below
Market simulation	20,000 to 40,000	Post trial useup and repeat rate	Unreality of "laboratory" marketing
Controlled test market	50,000 to 75,000	Saves selling lead time. Sales force effort unneeded	No sales force and distribution experience
"Mini" market (less than 1% US)	>100,000	Greater realism. Getting selling experience	Media and demographic unreality
Test market (1 to 10% US)	>200,000	Test variables more confidently	Still some media and demographic unreality
Regional introduction (Over 10% US)	>500,000	Preemptive	Regional peculiarities
National introduction[1]	>1,000,000	No lost time	High cost risk

[1] Involves full competitive exposure.

9.19 THE EFFECTS OF SUBLETHAL CONCENTRATIONS OF WHOLE BLEACHED KRAFTMILL EFFLUENT ON THE GROWTH AND FOOD CONVERSION EFFICIENCY OF UNDERYEARLING SOCKEYE SALMON (ONCORHYNCHUS NERKA)

Webb, P. W., and J. R. Brett (Fisheries Research Board of Canada, Pacific Biological Station, Nanaimo, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1555-1563 (Nov. 1972)

The changes in growth rate and gross conversion efficiency were determined for underyearling sockeye salmon during and after exposure of the fish to full bleached kraftmill effluent (BKE). Groups of sockeye salmon were exposed for 56 days to 0, 1.0, 2.5, 10, and 25% of BKE (v/v). For these tests, a fresh 24-hr. composite of the effluent at pH 6.8 was used daily (after filtering). Growth of the fish was examined for an additional 56 days after their exposure to BKE. Sixty fish per tank were used; the temperature was held at 15° C.; and the dissolved oxygen was maintained between 90 and 100% air saturation.

The growth rate and conversion efficiency of the fish were not affected at the 0.1% and 2.5% BKE levels. At the 10% BKE level, reduced growth rate and conversion efficiency were not statistically significant from the controls but were considered to be important biologically in estimating threshold response levels. At the 25% BKE levels, there were statistically significant reductions in growth rate and conversion efficiency. The fish did not show recovery in retarded growth after exposure to BKE. Exposure to BKE had no effect on the condition of the fish. The EC50 (mean effective concentration above which growth or conversion would be reduced) of the bleached kraftmill effluent was about 3.7% (v/v).
[5 figures, 1 table, 23 references] FTP

9.2

to absorb material emissions place some limits to material growth. (3) A long delay exists, typically, in the effective response of society to any problem associated with material and population growth. These three characteristics of social systems have serious implications and are sufficient to introduce a pronounced tendency toward system instability.

Three possible ways to decrease the instability of our growing economic system are (1) Raise the effective limits to population and economic growth through technologies that allow more efficient use of resources or create less harmful impact on the environment. (2) Decrease the rate of physical growth through deliberate social and economic changes. (3) Reduce the length of system delays. Many social delays could be avoided if policies could be based on anticipation of social needs, rather than on responses to them. Our policies do have important, long-term implications for our social, economic, and ecological system, and we should assign a high priority to developing the appropriate forecasting technology.

Any new social forecasting method must have at least four features: First, it must be able to integrate into one conceptual framework information that ranges in precision from intuitive perceptions to controlled measurements of physical systems. Second, the analytical frameworks should provide a neutral vocabulary that permits professionals from many different fields to cooperate directly in pooling their knowledge. Third, a philosophy of system structure is required that acknowledges the complexity, the nonlinearities, the delays, and the tenuous casual relationships that determine the behaviour of real-world systems. Fourth, a new theory of inference and a set of formal techniques are needed that will permit analysts to assess the confidence that may be assigned to conclusions derived from complex, nonlinear, underidentified, simulation models.
[7 references] FTP

9.2 LOUISIANA COMMERCIAL FISHERIES
(1.0117)

Jones, Lamar B., and G. Randolph Rice (Dept. of Economics, Louisiana State University, Baton Rouge, LA 70803)
In An Economic Base Study of Coastal Louisiana, Chapter 8, pp. 67-81 (1972), Publication No. LSU-SG-72-02. (Center for Wetland Resources, Louisiana State College, Baton Rouge, LA 70803)

The Louisiana commercial fishing industry led all 50 states in volume of catch, in 1968, 1969, and 1970, and it ranked third in value of catch in 1969. These values are a culmination of growth of the menhaden and shrimp industries. Louisiana accounted for 55% of the U.S. menhaden catch, and 27% of the U.S. shrimp catch.

Exports of U.S. fishery products increased from $36.8 million to $104.5 million in 1969. A substantial part of the increase was attributable to Louisiana brown shrimp production and oil from menhaden processing.

The oyster catch is the third most valuable fishery in the state. In 1969, the oyster landings total was 9.2 million pounds valued at $4 million. These figures are substantially reduced from 1968 catches; heavy damage in August 1969 by Hurricane Camille is responsible in part for the reduced oyster landings and values.

The state's commercial fishing industry employed 12,529 fishermen (the second highest number in the nation), and 5,664 shore workers in 1967. Louisiana had 1,698 large vessels (5 net tons and over) and ranked fourth in total number of vessels in the United States. Most of these were in the 300 to 399 horsepower

(over)

9.3 RECENT PROGRESS IN THE CONSIDERATION OF FLAVORING INGREDIENTS
(3.12) UNDER THE FOOD ADDITIVES AMENDMENT. 6. GRAS SUBSTANCES

Oser, Bernard L. (Food and Drug Research Laboratories, Inc., Maurice Ave., at 58th St., Maspeth, NY 11378), and R. A. Ford (Dept. of Chemistry, Montgomery College, Takoma Park, MD 20012)
Food Technology 27, No. 1, 64-67 (Jan. 1973)

This paper reports the latest results of evaluations of GRAS (Generally Recognized as Safe) status of 65 substances.
[1 table] FTP

9.6 NEW JOURNAL ANNOUNCEMENT

Crane, Russak & Co. Inc. (Publisher), 52 Vanderbilt Ave., New York, NY 10017

The publisher announced the beginning of publication of two new journals, as quarterlies, early in 1973. The first, Ocean Development and International Law Journal, will deal with the varied matters bearing on the international aspects of ocean regulation, ocean affairs, and all forms of ocean utilization having international interest. The second, Coastal Zone Management Journal, will be concerned with the social, political, technical, and legal aspects of coastal zone management in North America. The price of a yearly subscription for 1973 for each of the journals is $26.00, postpaid. The four quarterly issues of each journal are expected to total about 400 pages. FTP

9.7 CITATION ANALYSIS AS A TOOL IN JOURNAL EVALUATION

Garfield, Eugene (Institute for Scientific Information, Philadelphia, PA 19106)
Science 178, No. 4060, 471-479 (Nov. 3, 1972)

Little is understood, as a communication system, about the large array of journals that play a dominant role in the exchange of scientific information. The frequency of citation can reflect the value of a journal and the use made of it. The author presents results of an application of citation analysis.

The results show that there is a predominance of a small group of journals in the citation network. A combination of the literature of individual disciplines and specialties produces a multidisciplinary core for all science comprising no more than 1,000 journals. This essential core could be made up of as few as 500 journals if, for example, an attempt is made to satisfy the needs of libraries in developing countries.

Citation analysis is useful in several areas. It is of potential value in the management of library journal collections. It can be used by individual scientists in selecting journals to read and keep as well as for compiling reference and reading lists. It can be used by editors and editorial boards as useful indicators of a journal's performance in the extent of self-citation, the number of times cited each year, and the distribution of citations among citing journals within and outside the specialty literature. An important application for citation analysis is in studies of science policy and research evaluation.
[8 figures, about 55 references] FTP

9.3 (9.19) U.N. GENERAL ASSEMBLY ESTABLISHES MACHINERY FOR INTERNATIONAL ENVIRONMENTAL COOPERATION

McGee, Gale W. (U.S. Representative to the United Nations General Assembly)
Department of State Bulletin 68, No. 1751, 53-59 (Jan. 15, 1973)

This report consists of a statement presented by Senator Gale W. McGee in Committee II (Economic and Financial) of the U.N. General Assembly on Oct. 20, 1972, on international environmental cooperation and the texts of three resolutions adopted by the U.N. General Assembly on Dec. 15, 1972. The three resolutions are: G.A.R. 2994, United Nations Conference on the Human Environment; G.A.R. 2995, Cooperation Between States in the Field of the Human Environment; and G.A.R. 2997, Institutional and Financial Arrangements for International Environmental Cooperation. [7 footnotes] FTP

9.2 (1.0117)

range; all but a fraction were used in the shrimp, menhaden, and oyster fisheries. The fleet also employed 6,133 smaller boats: the shrimp industry used 3,765; the remainder were used in the crab, oyster, menhaden, catfish, and crawfish industries.

More plants producing canned and industrial fishery products are located in Louisiana than in the other seven South Atlantic and Gulf states. In 1972, 35 firms were listed as dealing in fresh or frozen packaged seafoods, 27 in canned and cured seafoods, and 6 were listed in animal and marine fats and oils. Most of the canning activity involved shrimp, and in 1970 the value of production was $26.5 million. The large-scale industrial fishery is due to the substantial menhaden catch. Louisiana had 30 plants in 1970 engaged in industrial fishery production with a value of $30.1 million: 30% of the national total.

The state's shrimp industry employed 8,875 fishermen in 1967: 80% of all fishermen in the state. The otter trawl was the method used for harvesting 90% of the shrimp taken. The heaviest landings of shrimp are normally from May to November, but shrimping activity is year-round.

The fishing industry in Louisiana is a vital component of the national fishing industry and of the Louisiana economy.
[2 figures, 12 tables, 61 references] SW

9.7 FOOD SCIENCE COURSES FOR NON-FOOD SCIENTISTS

Morse, R. E. (Dept. of Food Science, College of Agriculture and Environmental Science, Rutgers--the State University, New Brunswick, NJ 08903)
Food Technology 27, No. 1, 58-60 (Jan. 1973)

Courses in food science for nonfood science majors are briefly described. Twenty-two universities giving such courses are listed, and typical course outlines in five universities are given. The course outline for one university consisted of:

Introduction;
Man's food and history;
Man's proper foods;
Man's improper foods;
Toxicity;
Toxicity and U.S. laws;
Protein foods;
Fat foods;
Carbohydrate foods;
Free discussion;
Vitamins and minerals;
Water;
Food preservation;
Food microbiology;
Food storage;
Food spoilage;
Food canning;
Food drying;
Food dehydration;
Food freezing;
Free discussion;
World population;
Food acceptance;
Food from land;
Food from sea;
Solutions to feeding the world; and
Summary and discussion.

[2 tables] FTP

9.6 (9.11) EXPLORING THE OCEAN WORLD

Idyll, C. P. (editor)
Published by Thomas Y. Crowell Company, New York (1972), i-viii + 296 pp. Price not given.

In this book the concept of oceanography is divided into the several diverse sciences which it comprises. There are 11 chapters in the book, each written by an expert on the subject, and his professional affiliation is identified. The chapters are as follows:

"The Science of the Sea," p. 2;
"The Underwater Landscape," p. 22;
"Biology of the Sea," p. 42;
"Physics of the Sea," p. 62;
"Chemistry of the Sea," p. 98;
"Food From the Sea," p. 130;
"Farming the Sea," p. 148;
"Mineral Resources and Power," p. 164;
"Underwater Archaeology," p. 196;
"Marine Ecology and Pollution," p. 232; and
"Man Beneath the Sea," p. 248.

Historical events associated with oceanography are listed, plus a substantial bibliography, and an index. The book is profusely illustrated with photographs, drawings, and maps. SW

9.19 CAPACITY OF MARINE PHYTOPLANKTON FOR ACCUMULATING A CHLORINATED BIPHENYL

Van Leeuwen, B. L. J. (Netherlands)
Chemical Abstracts 77, No. 15, 97203u (Oct. 9, 1972)

9.19 (7.42) MERCURY DETERMINATION IN BIOLOGICAL MATERIALS WITH THE AID OF A MVCM [MERCURY VAPOR CONCENTRATION METER] APPARATUS

Opalka, Stefan, and Ewa Mizikowska (Osrodek Badaw. Kolejowej Sluzby Zdrowia, Warsaw, Poland)
Chemical Abstracts 77, No. 11, 70958g (Sept. 11, 1972)

9.19 (7.42) ASSAY OF MERCURY IN FISH

Schulert, Arthur, Abid Zeind, James Davis, and D. Gordon Nicholson (Environ. Sci. and Eng. Corp., Nashville, Tenn.)
Chemical Abstracts 77, No. 11, 70952a (Sept. 11, 1972)

9.19 (6.135) (0.8) PREVENTION OF OFFENSIVE ODOR FROM FISH PROCESSING PLANTS. VII. EFFECT OF ELECTROLYSIS OF SCRUBBED WATER ON REDUCTION OF OFFENSIVE ODOR

Motohiro, Terushige, and Noboru Kimura (Japan)
Chemical Abstracts 77, No. 22, 143529e (Nov. 27, 1972)

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

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0.35 BIOCONVERSION OF THE DIETARY BRASSICASTEROL TO CHOLESTEROL IN ARTEMIA SALINA

Teshima, Shin-ichi, and Akio Kanazawa (Faculty of Fisheries, University of Kagoshima, 470 Shimoarata-cho, Kagoshima, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1305-1310 (Nov. 1972)

Earlier work indicated that insects and marine crustaceans probably lack the ability to synthesize sterols and that their sterols originate from exogenous sources (such as their diet). However, in previous papers the authors reported that Artemia salina (common brine shrimp) converts the dietary ergosterol and 24-methylcholesterol to cholesterol. Also, the senior author reported earlier that the prawn Penaeus japonicus and the crab Portunus trituberculatus are able to convert β-sitosterol and ergosterol, respectively, to cholesterol. These findings tend to suggest that marine crustaceans probably do have the enzyme systems to convert C_{28}- and C_{29}-sterols to cholesterol. In this paper, the bioconversion of brassicasterol to cholesterol in Artemia salina, is described. A. salina were fed the diatom Cyclotella nana, containing ^{14}C-labeled brassicasterol.

The sterols were then isolated from the organism. The isolated sterols subjected to gas-liquid chromatography showed the presence of one component corresponding to cholesterol of relatively high radioactivity. After confirmatory tests, the authors, concluded that A. salina is capable of converting dietary brassicasterol to cholesterol.

[4 figures, 3 tables, 15 references] FTP

0.36 METABOLIC RESPONSES OF THE FRESH-WATER BIVALVE, PLEUROBEMA COCCINEUM (CONRAD), TO ANAEROBIC CONDITIONS

Badman, David G., and Sandra L. Chin (Dept. of Biology, Kalamazoo College, Kalamazoo, MI 49001)
Comparative Biochemistry and Physiology 44, No. 1B, 27-32 (Jan. 15, 1973)

Earlier work has indicated that bivalves can withstand lack of oxygen for long periods and, in this condition, they undergo a rapid decrease in glycogen with production of large amounts of CO_2. Most of the bivalves in these experiments came from intertidal areas. To study the responses of fresh-water bivalves to anaerobic conditions, clams were taken from the Kalamazoo River and acclimated in aquaria containing spring water at 20° C., without feeding, for 1 week. Oxygen consumption of these clams was measured. The same clams were then held in air for 5 days, and oxygen consumption was measured again. The oxygen consumption of whole clams was too variable for reliable results. However, the oxygen consumption of clams held in air (anaerobic condition) was slightly higher than normal.

Gill tissues removed from well oxygenated clams and from clams held under anaerobic conditions for 5 days were measured for oxygen consumption. The results show that the oxygen consumption of gill tissue from clams subjected to anaerobic conditions is higher than gill tissue from clams held in water (aerated).

Whole clams subjected to aerobic and anaerobic conditions were tested for glucose and glycogen content. Clams exposed to zero oxygen conditions contained less glycogen than oxygenated clams for the first 24 to 48 hr.; however, there

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0.38 PROPERTIES OF FISH GASTRIC HYALURONIDASE

Kitamikado, Manabu, and Hiroshi Yamamoto (Lab. Fish. Tech., Fac. Agr., Kyushu Univ., Fukuoka, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1275-1280 (Nov. 1972)

In earlier work, the authors found hyaluronidase in the stomach of certain fish; the enzyme acts as a N-acetylhexosaminidase. Because of an interest in its origin, they investigated the properties of the enzyme. An electrophoretically homogeneous enzyme was prepared from the gastric mucosa of the mackerel Scomber japonicus to determine its physical and chemical properties.

Fish gastric hyaluronidase shows optimum activity at pH 4.8; optimum activity of the enzyme shifted to pH 2.8 when NaCl was present at the 0.15 M level. NaCl, KCl, and $MgCl_2$ enhanced the activity of the enzyme; the enhancement was attributed to the presence of the ion Cl^-. The ion Zn^{++} (at 10^{-4} M) also enhanced the activity of the enzyme; Ag^+ and Cu^{++} had no appreciable effect on the activity; and Hg^{++} inhibited the activity. Under the conditions tested, the maximum activity was at 50° C. The Michaelis constant for the enzyme reaction was 0.5 mg. per milliliter. The molecular weight of hyaluronidase is about 56,000.

[8 figures, 3 tables, 17 references] FTP

0.4 (9.11) TEKTITE II. MEDICAL SUPERVISION OF THE SCIENTISTS IN THE SEA

Beckman, Edward L., and Elizabeth Miremont Smith (Marine Biomedical Institute, University of Texas Medical Branch, Galveston, Tex.)
Texas Reports on Biology and Medicine 30, No. 3 (Special Issue) (Fall 1972), 204 pp. (Published by the University of Texas Medical Branch, Galveston, TX 77550). Price not given.

Undersea exploration and research offer possibilities of: (1) a bolster to the fishing industry through the development of new equipment and technology; (2) a source (the sea floor) of ore, chemicals, and minerals; (3) the sea as a source of food and of fresh water; (4) use of submersible observation vehicles to aid in more exact weather forecasting; (5) the sea as source of pharmaceuticals; and (6) the undersea for tourism.

Conventional methods of working underwater have limitations; for example, a man working at a depth of 40 ft. or below of water for more than 4 hr. must undergo decompression procedures. Also, careful management of breathing mixtures and excursion depths is required. One primary purpose of the Tektite program was to demonstrate the superiority of working undersea as a resident rather than working in short terms from the seashore or from a diving platform. The Tektite programs consisted of a series of scientific missions in which the scientists remained in and worked from an underwater dwelling for extended periods.

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was no difference in glycogen levels between the two groups after 48 hr. Glucose levels were affected in a similar manner.

Clams in low, not zero, oxygen levels are not affected by such conditions. These results help to explain how the clam is unaffected by the low oxygen conditions of the Kalamazoo River in late summer when the temperatures are up to 34° C. Lactic acid is present in the clam after anaerobiosis but in insufficient quantities to account for the low levels of carbohydrate found.
[2 tables, 15 references] SW

0.36 (6.3) RESPIRATION AND RESISTANCE TO ANAEROBIOSIS OF FRESHWATER ALGAE

Dokulil, Martin (Pflanzenphysiol. Inst. Univ. Wien, Vienna, Austria)
Chemical Abstracts 77, No. 17, 111674g (Oct. 23, 1972)

0.4 (9.11)

This bulletin reports on the medical supervision of the scientists in the sea. It covers the following subject areas: Saturation Diving; Tektite I (history, objectives, ...); Evolution of Project Tektite II (objectives, ...); Medical Staff and Responsibilities; Psychological Monitoring; The Spectrum of Medical Supervision of the Aquanauts; Other Medical and Biological Objectives (training offered the physicians, testing and validating decompression schedules, ...); Tektite Logistics (the complex, the habitat, life support systems, dietary requirements, ...); Mission-by-Mission Experiences (daily routine, individual missions, ...); The Aborted 100-FSW (Minitat) Program; Decompression Tables; General Medical Observations; Some Preliminary Psychological Observations; Biochemical, Hematological, and Endocrine Studies; and Conclusions.

The 53 aquanauts involved in this study lived in the underwater habitat for periods of from 2 to 4 weeks without developing any significant medical problems. Apparently, there is no significant detrimental physiologic response to living at increased ambient pressure for such long periods. On the basis of the results, the previously established decompression procedures were modified. FTP

0.38 (8.59) STUDIES ON THIAMINASE I IN MARINE FISH--I. THIAMINASE IN ANCHOVY

Ishihara, Tadashi, and Masato Yasuda (Faculty of Fisheries, Nagasaki University, Nagasaki, Japan), and Hitoshi Morooka (Nagasaki Women's Junior College, Nagasaki)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1281-1287 (Nov. 1972) (In Japanese; figures, tables, and abstract in English)

In this study, the authors verified the presence of thiaminase in the anchovy Engraulis japonica. In addition, some properties and distribution were studied. The pH for optimum activity of the enzyme is 5.5. Its activity disappears when the enzyme is heated at 90° C. for 10 min. Enzyme activity is inhibited by p-chloromercuribenzoic acid, iodoacetamide, and monoiodoacetic acid; enzyme activity is recovered up to 85% of its original value in the presence of cysteine. The levels of thiaminase in the various parts of the anchovy, in decreasing order, are kidney (the level of thiaminase in this organ was particularly high), liver, pyloric caecum, intestine, stomach, and muscle. The level of enzyme activity in the anchovy is comparable to that in carp Cyplinus carpio. The enzyme is particularly activated by pyridine, but also by aniline and quinoline.
[8 figures, 4 tables, 18 references] FTP

0.5 (9.15) ISOLATION OF ALEUTIAN MINK DISEASE VIRUS BY AFFINITY CHROMATOGRAPHY

Kenyon, A. J. (Dept. of Pathology, University of Minnesota Medical School, Minneapolis, MN 55455), J. E. Gander, C. Lopez, and R. A. Good
Science 179, No. 4069, 187-189 (Jan. 12, 1973)

The virus causing the Aleutian disease of mink was isolated by affinity chromatography. Infective particles resembling picornaviruses were released by dissociation of the immunoadsorbent-virus complex with 0.75 molar sodium chloride and then with a glycine-hydrochloride gradient. Two different types of virus-antibody complexes were formed, one that is dissociated by sodium chloride and another that requires glycine-hydrochloride in addition to sodium chloride for release of the virus.
[2 figures, 1 table, 17 references] FTP

0.5 MICROBIAL CONVERSION OF MERCURY COMPOUNDS. II.

Yamada, Masaru, Kensuke Kurukawa, and Kenzo Tonomura (Gov. Ind. Res. Inst. Microbiol., Japan)
Chemical Abstracts 77, No. 17, 111311m (Oct. 23, 1972)

0.4 (1.86) THE EVOLUTION OF SEX PHEROMONE COMMUNICATION IN THE ARTHROPODA

Kittredge, J. S., and F. T. Takahashi (Div. of Neurosciences, City of Hope National Med. Center, Duarte, CA 91010)
Journal of Theoretical Biology 35, 467-471 (1972)

Considerations of the evolution of the biology and behavior of animals must acknowledge the improbability of the occurrence of two de novo events.

Chemical communication is thought to be the prime mode of communication in most animals. It is composed of two complex activities: (1) the biosynthesis, storage, and release of a substance; and (2) the reception and translation of this message into a behaviorial pattern. Both of these activities in the Arthropoda may be polygenic complexes. The probability of the simultaneous (de novo) occurrence of the two capabilities during the evolution of this group of animals is essentially zero.

The finding that crustecdysone, the molting hormone, is also the sex pheromone [a substance secreted by an animal that influences the behavior of other individuals in the same species] of some brachyuran crabs suggests an explanation for the appearance of two capabilities simultaneously. The authors suggest that the ancestors of the crabs, having evolved a steroid molting hormone, were equipped with the polygenic synthetic capacity to produce the steroid involved and the genetic information controlling the structure of the hormone receptor site on the target organs. The steroid possessed chemical specificity and limited solubility in aqueous systems; thus, these properties would promote high binding to receptor

 (over)

0.8 (2.3) APPLICATIONS OF PLATE AND SCRAPED SURFACE HEAT EXCHANGERS

Smith, R. W. (Dairy Dept., Alfa-Laval Co., Ltd., United Kingdom)
Food Manufacture 47, No. 10, 37-38, 40 (Oct. 1972)

Two basic processes of heat exchange are used: direct and indirect. In the direct process, steam is injected directly into the product to raise the temperature, and then the vapor is flashed off in a vacuum chamber. This method is used for low viscosity products. In the indirect heat exchanger a plate or tube wall separates the product from the heating or cooling medium. The indirect method is applied in all the following types: plate heat exchangers (PHE), closed tube heat exchangers (CTHE), and scraped surface heat exchangers (SSHE).

For high heat transfer rates turbulence is induced into the product to prevent static films forming on the heat transfer surfaces. In the PHE, turbulence is induced by patterns pressed into the surface of the plates. Pump pressure induces turbulence in the individual tubes of the CTHE. Because of inspection difficulties and sanitary problems CTHE is not used for processing foods. In the case of SSHE, turbulence is mechanically induced into the product by the action of a rotor carrying scraper blades.

PHEs are used for a wide range of low-viscosity liquid products and have the advantages of sanitary design, simple maintenance, and quick dismantling for inspection. In addition, if more capacity is required, more plates can be installed on a given piece of equipment. Moreover, a PHE can conserve heat by preheating incoming product with previously heated product which is flowing toward the cooling section. The PHE is limited to liquid products that do not contain particulate

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0.8 (2.3) HEAT TRANSFER AND HEAT EXCHANGERS

Darlington, R. (Research and Development Division, A.P.V. Co., Ltd., Crawley, Sussex, England)
Food Manufacture 47, No. 10,31, 33, 34 (Oct. 1972)

Heat exchange is an operation in the food industry that is frequently referred to either as cooking, baking, drying, evaporating, freezing, or sterilizing. To keep the cost of the heat exchange equipment to a minimum, the designer should aim for the highest value for the overall heat transfer coefficient (U), the lowest area available for heat transfer (in square meters) (A), and an optimum log mean temperature difference between the fluids (in °C.) (ΔT). These considerations are based on the general fundamental formula for heat transfer: $Q = (U)(A)(\Delta T)$, where Q = quantity of heat transferred in a given time.

Heat transfer in processing prevents microorganisms from causing deterioration: freezing slows or stops their activity; drying prevents growth; and sterilizing by heat kills. To prevent deleterious effects on the nutritional entities in the product, the process conditions should be defined very carefully relative to temperature.

In choosing equipment, four factors should be considered: hygiene, safety (of food products), accuracy of measurement, and reliability. Cleanliness of parts and accessibility for cleaning are necessary adjuncts to hygiene. To maintain safety of foods instrumentation is required so that malfunction of the processing can be recognized and the unacceptable product diverted from shipment to

(over)

0.7 THE ALTERNATIVE USES OF FISH

Burgess, G. H. O. (Torry Research Station, Aberdeen, Scotland)
FAO Fisheries Reports, No. 117, 28 pp. (1971) (Food and Agricultural Organization of the United Nations, Rome, Italy)

The growing world deficit in protein supplies has increased interest in the utilization of unfamiliar species of fish. Although not always acceptable for direct human consumption, these fish, when processed, may yield an acceptable nutritious product. To place these conditions in perspective, a review of fish utilization and the requirements of fisheries is presented.

The world use of fresh and cured fish has been remarkably unchanged in the 5-year period, 1965 to 1969. In the same period, tonnage of frozen and canned fish has increased from 6.2 to 8.6 and 4.6 to 5.8 million, respectively. For purposes of reduction to industrial products, the world catch of fish over the same period has increased from 15.4 to 21.6 million tons.

The increased production has not resulted in an increase in protein available to the inhabitants of underdeveloped countries. Most of the catch taken off the coasts of these countries is exported to the developed countries.

The author believes that only through government intervention in the underdeveloped nations with assistance from developed countries can the fisheries, processing plants, and home markets be developed to make up the protein deficits that prevail. [3 tables, 95 references] SW

0.8 (2.3)

consumers. The accuracy and rapid response of temperature regulation is mandatory in maintaining the quality of product in high temperature short time (HTST), processing.

Steam-jacketed pans are used for small-scale batches. Plate heat exchangers are most useful for HTST processes. The plate machine can also incorporate heating, cooling, and heat recuperation. Tubular heat exchangers are suitable for fluids containing particles over 3×10^{-3} to 4×10^{-3} m. in diameter. Scraped surface heat exchangers are used for processing in which the product viscosity rises to a point that makes other heat exchangers of no benefit.

In evaporative food processing the hemisperical steam pan is best known for small batch operations at reduced atmospheric pressure. Film-type evaporators are used for liquids of low and medium viscosities. Film evaporators can be of either tubular or plate type and are capable of evaporating liquids of high viscosities at high temperatures and short contact times. The centrifugal evaporator rotates the product at high speed and can be used for HTST processing. Size of units is limited because of mechanical problems. Wiped film evaporators are basically vertical cylinders in which a wiper blade rotates. This unit is used to process very viscous materials and is generally used as a finisher.

In the near future, heat exchanger equipment is expected to be so advanced as to make present day sophisticated equipment appear to be antiquated.

[3 photographs] SW

1.013 PERUVIAN FISHERIES: CONSERVATION AND DEVELOPMENT
(1.21)

Smetherman, Bobbie B., and Robert M. Smetherman (California State University, Fresno, Calif.)

Economic Development and Cultural Change 21, No. 2, 338-351 (Jan. 1973)

This article is an examination of the effects of the fishmeal boom on the politics and economic development of Peru.

[2 tables, 49 references] FTP

0.4 (1.86)

site and facilitate detection at extreme dilution. With evolutionary externalization of the receptor site, the crabs were then capable of pheromone communication. The increased capacity of the males to detect receptive females provided the evolutionary pressure to fix this capability into the genome. Later evolutionary selection resulted in sexual dimorphism (having two different forms according to sex) and the detection capability became integrated into pre-existent mating behavior in the male. The dimorphism suggests that the organization of the pheromone receptor is induced by the sex hormones. At this stage the behavior response in the male to the pheromone was further altered. The pheromone must now function as a releaser for search and display behavior as well as a primer in the physiological change in the response in the male.

Duplication of these polygenic capacities provided the foundation of sex pheromone communication in the arthropoda which through mutation evolved into its sophisticated expression in modern insects.

[9 references] SW

0.8 (2.3)

matter. Particles can bridge across a narrow passage in the plate and may 'burn' on in a heating section. Also deposition on the surfaces will occur causing a reduction in heat transfer and increase in pressure drop. The SSHE can process highly viscous liquids, other liquids containing particles, and products that tend to deposit a film or form crystals on the surface. The scraper blade continually removes deposits--which could reduce heat exchange--thereby maintaining the rate of heat transfer. This type of heat exchanger is made of nickel with a hard chrome-plated finish on the product contact side. The SSHE is probably the most versatile of all types of heat exchangers; however, it is more expensive in terms of capital costs.

[3 photographs] SW

1.0152
(9.10)

ECOLOGICAL AND MORPHOLOGICAL STUDY ON FISH-FAUNA FROM THE WATERS AROUND TAIWAN AND ITS ADJACENT ISLANDS. 2. NOTES ON SOME RARE CONTINENTAL SHELF FISHES AND DESCRIPTION OF TWO NEW SPECIES

Shen, Shin-Chieh, and Wai-Hwa Ting
Bulletin of the Institute of Zoology Academia Sinica 11, No. 1, 13-31 (June 1972)
(Institute of Zoology, Academia Sinica, Nankang, Taipei, Taiwan, Republic of China)

Five rare species and two new species of deep-water fish caught from more than 100 meters deep by single trawling net in northeastern (Ta-chi) and southwestern (Tung-kong) continental shelf and Pescadore Islands are described. The five rare species are as follows: Deania aciculata (Garman), Etmopterus lucifer Jordan and Snyder, Ateleopus japonicus Bleeker, Gonorhyrchus abbreviatus Temminck & Schlegel, Xiphasia setifer Swainson. The two new species are Dalatias tachiensis n. sp. and Squatina formosa n. sp.
[7 figures, 2 tables, 28 references]
FTP

2.05

BOTULISM

Anonymous
Journal of Food Science 37, No. 6, 985-988 (Nov.-Dec. 1972)

This article is a scientific status summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition. Botulism is a rare but a particularly notorious type of food poisoning, affecting the human nervous system. The article contains a brief discussion of the incidence of botulism, a description of the microorganism and the illness, the different types of Clostridium botulinum organisms involved, the distribution of the organism in nature, cause of the outbreaks, method of determining the cause of the outbreaks, growth of the microorganism, methods of commercial control, and procedures for keeping foods safe. Most outbreaks of botulism are caused by home-preserved (canned) foods. Commercial canning procedures are adequate, with a sufficient margin of safety, to destroy the spores of the organism. Foods can be kept safe from botulinum poisoning by use of good sanitation and of proper processing procedures. A list of U.S. Government documents on the methods of handling, freezing, and canning of foods in the home are given. The documents are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.
[7 references]
FTP

1.88
(9.16)

THE CULTIVATION OF THE EUROPEAN MUSSEL, MYTILUS EDULIS LINNAEUS

Mason, James (Marine Laboratory, Aberdeen, Scotland)
Oceanography and Marine Biology Annual Review 10, 437-460 (1972)

The total world harvest of mussels in 1969 was over 320,000 metric tons. The common European mussel M. edulis accounted for more than 80% of the total. The mussel is a luxury commodity, and the demand exceeds the supply.

The mussel is widely distributed in the boreal (northern) regions of the northern hemisphere, and it can survive wide ranges of environmental conditions. Fast growing mussels with plump flesh can be produced by suitable methods of cultivation. Salinity appears to influence growth rate. The best growth rates have been reported in waters of high salinity, at temperatures ranging between 10° and 20° C., and in light conditions described as half sunlight.

The enemies of mussels must be considered by cultivators and are either predators, competitors, or parasites. The chief predators are starfish and crabs. Competitors of mussels include barnacles, tube-worms, bryozoans (sea mosses), ascidians (sea squirts), sponges, and algae. The competition is for space and food. High concentration of mussels increases vulnerability to parasites. These include larval trematodes (flat worms or flukes) and a copepod (a minute crustacean) which make mussels unsuitable for market.

Mussels are cultivated on poles, or on the seabed, or on suspended ropes. There are two public health hazards associated with mussel cultivation: poisoning due to phytoplankton blooms (paralytic poisoning) and bacterial pollution. Both
(over)

2.08
(2.00)

CHANGES IN QUALITY OF CHANNEL CATFISH HELD ON ICE BEFORE AND AFTER PROCESSING

Heaton, E. K. (Dept. of Food Science, University of Georgia Agricultural Experiment Stations, Georgia Station, Experiment, GA 30212), Jimmy Page, and James W. Andrews (Skidaway Institute of Oceanography, Savannah, GA 31406), and T. S. Boggess, Jr.
Journal of Food Science 37, No. 6, 841-844 (Nov.-Dec. 1972)

Earlier work at the authors' laboratories revealed that the quality of market catfish varied considerably and that the quality might be related in part to the different handling and processing practices used. Three series of tests were carried out. The first series was designed to evaluate the effects on the quality of the meat of feeding the fish up to the day of harvesting and of withholding feed for 24 hr. before harvesting. In each of these two groups, 10 fish were processed and examined immediately, and a similar number was held for 6, 12, 24, 48, and 96 hr. before processing and examining.

In the second series, the effects of holding the whole fish on ice and at ambient temperature were examined. Fish from both the fasted and nonfasted lots were held in crushed ice for 0, 12, or 48 hr., then were held for 0, 4, or 8 hr. before dressing and testing.

In the third series, the effects of storing the dressed catfish directly in crushed ice (ice-pack) or packaged in plastic bags and then packed in crushed ice (chill-pack) were determined. The ice-pack and chill-pack dressed catfish were held in ice for 0, 2, 4, 8, 12, or 16 days before being examined. Quality
(over)

1.88

problems can be controlled by the self-cleansing characteristics of the mussel in clean water.

Mussel cultivation is a way of making better use of primary production of the sea. These sessile, bottom-dwelling filter-feeders, through their ability to filter food from water brought to them by currents from a much greater region than they actually occupy, often attain great productivity in areas of intensive cultivation.

Mussels are successfully cultivated on the coasts of southern and central Europe. Furthermore, experiments conducted in the inlets of the Scottish and Norwegian coasts have shown that mussels can be successfully grown there. Although mussels are abundant in North America, they are not considered a source of food. The prospects of continued expansion of mussel culture are good, but they will be grown for the more profitable end use as luxury food. As costs of production decrease, cultivation of mussels for improving substandard diets of underdeveloped countries will be feasible.
[9 figures, 114 references] SW

1.83 (9.10) ECOLOGY OF NEW ZEALAND ABALONES, HALIOTIS SPECIES (MOLLUSCA: GASTROPODA)

Poor, Gary C. B. (Fisheries and Wildlife Dept., Melbourne 3000, Australia)
New Zealand Journal of Marine and Freshwater Research 6, Nos. 1-2, 11-22 (Jun. 1972)

Abalones have been a basic food item in the orient since ancient times, and they are gaining appeal as a delicacy to western consumers. The genus Haliotis is distributed worldwide; New Zealand and adjoining islands have three species: H. iris (Martyn, 1784); H. australis (Gmelin, 1790); and H. virginea (Gmelin, 1790).

H. iris reaches a maximum size of about 170 mm., H. australis about 110 mm.; both are most abundant immediately below low-tide mark down to about 4 m. H. virginea reaches a maximum size of about 70 mm. and is most common in deeper water, about 27 m.

Examination of gut content of H. iris and australis indicated that they fed mainly on red algae at all times of the year, but feeding was heaviest in the winter. Brown algae is available on various coasts of the islands and is also used for food by both species of abalone. They prefer red algae to brown algae. Juvenile H. iris fed red algae for 6 months in the laboratory grew faster than those fed brown algae.
[1 figure, 4 tables, 29 references] SW

2.08 (2.00)

evaluations included percent loss in weight during thawing and cooking; subjective ratings for appearance, color, aroma, flavor, and texture; and shear press firmness measurement of the cooked fish.

Channel catfish changed in quality more during the first 48 hr. on ice than during the second 48 hr. (from 48 to 96 hr.); the catfish may be held on ice for up to 24 hr. before processing and still yield a highly satisfactory finished product. Panel ratings of the fish from fasted- and the fed-fish groups were not significantly different. The reduction in quality of channel catfish held at ambient temperature for 4 and 8 hr. was about equivalent to that of channel catfish held for 24 to 48 hr. in crushed ice. Dressed channel catfish retained acceptable quality when held in crushed ice for up to 12 days; those packaged in plastic bags and then held in crushed ice retained acceptable quality for 8 days.
[9 tables, 6 references] FTP

2.3 (2.8) PROCESS FOR THE MANUFACTURE OF FISH SOUP CONCENTRATE

Greguss, Akos, and Janos Engi (Szeged, Hungary); granted to Konzervipari Troszt, 19 Gubacsi u, Budapest IX, Hungary (pat.)
Canadian Patent 913,451
Patent Office Record (Canada) 100, No. 44, 4516 (Oct. 31, 1972)

Cooked fish is pulped, and the pulp is mixed with appropriate amounts of ground paprika, onion powder, and salt. FTP

2.3 BREADING APPARATUS

Harkey, C. N.; J. D. Jewell, Inc. (pat.)
U.S. Patent 3,703,382
Food Technology 27, No. 2, 89 (Feb. 1973)

This machine continuously applies a combination wet batter and dry breading to continuously moving pieces of food (including shrimp). FTP

2.1121 SHRIMP FISHING WITH TWIN TRAWLS
(1.85)(1.0116)
(1.0117)

Harrington, David L., Martin R. Bartlett, and James Higgins (Marine Extension Service, University of Georgia, Brunswick, Ga.)
Marine Extension Bulletin No. 1. Issued by the Georgia Sea Grant Program and the Marine Extension Center of the University of Georgia on Skidaway Island, P.O. Box 13687, Savannah, GA 31406 (1972), 10 pp.

Many shrimp boat fishermen in the Gulf of Mexico and off the southeastern United States have stopped using a single large trawl; instead, they use two smaller trawls, one each side of the boat. Two smaller trawls with a combined mouth opening of a given size are more productive than a single trawl with the same size opening. The improvement in fishing efficiency of the two smaller trawls is due to their lighter weight which reduces drag on the boat. Pulling less weight with reduced drag, the boat can go faster, and the nets can sweep more area in the time that a single large trawl is fished.

Another development has taken place in the shrimp fishery of this region. Instead of the two trawls being fished one on each side of the boat, two trawls (or twin trawls) are towed together on a single cable. Results of experimental shrimping with twin trawls indicate that they are more productive than previous methods of trawling.

A diagram of the rig viewed from above is shown in the figure. There are other diagrams in the article showing different sizes of sleds and a trolley

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2.14 AN ELECTRIC TRAWL SYSTEM FOR LOBSTERS

Saila, Saul B. (University of Rhode Island), and Cecil E. Williams
Marine Technology Society Journal 6, No. 5, 25-31 (Sept.-Oct. 1972)

Trawling for lobster off the New England coast, in contrast to pot fishing for lobster, has become a significant fishing industry. In 1970, 3.5 million pounds of lobster were taken by trawling off Rhode Island.

In trawling, the lower edge of the trawl is protected from damage by various forms of steel and rubber rollers. Lobsters must pass over the rollers before entering the trawl. Any device that could induce the lobster to leave the bottom just in front of the mouth of the trawl should increase the efficiency of trawling.

Problems involving a large power supply, complex equipment design, and high costs have kept the application of electric trawling at a low level despite the increased fishing efficiency it could provide. The authors have developed an electric trawl system which has overcome some of the problems.

The basic electric trawl system consists of an electronic pulse generator and a metallic electrode array towed in front of the net by a rope attached to the wing ends of the footrope. Connections were embedded in epoxy resin. An approximate 2-ft. horizontal space was maintained between electrodes, and opposite electrical polarity was applied to each successive electrode. The electrodes dragged the bottom during trawling operations as indicated by their scoured surfaces.

Tests were conducted to compare standard trawl, standard trawl with unenergized electrodes, and standard trawl with energized electrodes relative to

(over)

2.119 IMPROVING SAFETY OF WORK ON THE WORKING DECKS OF FISHING TRAWLERS [BEZPIECZEŃSTWO PRACY NA POKŁADACH ROBOCZYCH TRAWLERÓW RYBACKICH I MOZLIWOŚCI JEGO POPRAWIENIA]

Wójcik, T.
Budownictwo Okrętowe No. 11, 377-381 (1971) (In Polish)
Polish Technical and Economic Abstracts NR2(86), 107 (1972) [Published by Centrum Informacji Naukowej Technicznej i Ekonomicznej, Warzawa, Al. Niepodległości 186, Poland]

The discussion concerns the safety of fishermen working on deck relative to breakage of the trawl warp (on stern trawlers). The report also has a discussion on the advantages of an underdeck fish processing room and the mechanization of fish processing.
[6 figures] FTP

2.3 SHRIMP PROCESSING

Jonsson, G. (pat.)
British Patent 1,288,422
Food Technology 27, No. 2, 86 (Feb. 1973)

This apparatus is used to separate shrimp meat from the shell. FTP

2.3 SCALLOP EVISCERATION

Bunnell, C. M. (pat.)
U.S. Patent 3,703,022
Food Technology 27, No. 2, 86 (Feb. 1973)

This apparatus is designed to improve the efficiency of eviscerating scallops. FTP

2.1471 (0.8)

STUDIES ON APPROXIMATE FORMULAS FOR TENSION AND CONFIGURATION OF THE TOWING ROPE--III. METHOD OF APPROXIMATION OF THREE DIMENSIONAL PROBLEMS. IV. METHOD OF CALCULATION OF THREE DIMENSIONAL PROBLEMS

Miyazaki, Yoshio (Tokyo University Fisheries, Minato-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, Part III, 1215-1222; Part IV, 1223-1228 (Nov. 1972) (In Japanese; figures and abstract in English)

In these papers methods are described on how to calculate the tension at the warp of a two-boat trawl and to determine the configuration of the towing rope. In Part III an approximate calculation is described. Part IV gives a practical simplified method of calculation.
[Part III, 5 figures, 3 references; Part IV, 5 figures, 10 references] FTP

2.43

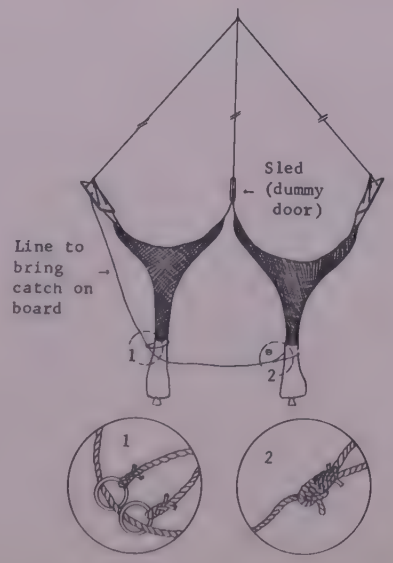
LOBSTER PACKAGE

Bowerman, Walter V. (Kingston, Ontario, Canada); granted to Du Pont of Canada Ltd., Montreal, Quebec, Canada (pat.)
Canadian Patent 912,904
Patent Office Record (Canada) 100, No. 43, 4414 (Oct. 24, 1972)

The lobster is packed in a pouch made of thermoplastic material. The freshly killed lobster is packed in the pouch, then the pouch is drawn snugly about the lobster by heat tempering while evacuating the air. FTP

2.1121 (1.85)(1.0116)(1.0117)

block system that is used to facilitate the handling of doors. Twenty-eight photographs in the article illustrate the operations of putting the doors overboard and retrieving them.
[33 figures]



SW

2.14

yield of crustacea and fishes. The results indicated the yields of lobster with this standard trawl were lowest; with standard trawl and unenergized electrodes the yields were better; and yields were best with standard trawl and energized electrodes. The data for crab yields were similar. The results of trawling for flatfishes were opposite those obtained for crustacea. The highest yields were from standard trawl, and the lowest yields were from standard trawl with energized electrodes. The authors concluded that the energized electrodes evoked an avoidance response in the fish.

Application of the electrode array will permit use of lighter trawl gear which does not dig into the bottom as much as conventional lobster trawling gear. This change should result in capturing more lobsters in better condition.
[5 figures, 6 tables, 13 references] SW

2.1127 POLY(VINYL ALCOHOL) GELS

Inoue, Taisei (Kuraray Co., Ltd.) (pat.)
German Offen. (Patent) 2,146,129 (May 10, 1972)
Chemical Abstracts 77, No. 10, 62982v (Sept. 4, 1972)

3.12 NITRITES, NITRATES, AND NITROSAMINES IN FOOD -- A DILEMMA
(2.9)

Anonymous
Journal of Food Science 37, No. 6, 989-992 (Nov.-Dec. 1972)

This article is a scientific status summary by the Institute of Food Technologists' Panel on Food Safety and Nutrition. Nitrosamines can be formed in food products from a reaction between nitrites and certain amines. Some of the nitrosamines are carcinogenic. Nitrite and nitrate are used in meat, some fish, and certain cheeses. Nitrites occur naturally in some foods; the amines occur naturally in foods as breakdown products from the precursors present. Certain cured meat products, such as those that are pasteurized and require post-processing refrigeration, could not be manufactured without nitrite. The nitrite in these foods (at a minimal level of 150 p.p.m.) inhibits the germination of spores of Clostridium botulinum. The dilemma that arises is, Should we prohibit the use of nitrite in human food? shall we limit the levels of use? or shall we conclude that enough data is not available to reach a reasonable decision and push vigorously to obtain more information? The article states that many scientists take the position that more data should be acquired quickly so that a sensible, considered judgment can be made.
[15 references] FTP

3.15 EXTENDING THE SHELF LIFE OF BROWN SHRIMPS
(1.85) (CRANGON VULGARIS FABR.) BY GAMMA IRRADIATION

Vyncke, W., and D. Declerck (Ministry of Agriculture, Fisheries Research Station, Stadhuis, B-8400 Ostend, Belgium)
Lebensm.-Wiss. u. Technol. 5, No. 5, 151-154 (1972)

The brown shrimp is an important and expensive food item in Western Europe. Because it is highly perishable in the chilled state an attempt was made to extend its keeping quality by gamma irradiation. The fresh shrimp were cooked at sea in the usual manner (6 to 10 min. in boiling [?] brine), packed in paper bags, then wrapped in polyvinylchloride stretch film before irradiation. The packaged shrimp were irradiated at doses of 0.05, 0.1, 0.2, 0.3, and 0.5 Mrad. After irradiation, the shrimp were stored at 0° C. and samples were examined at regular intervals of storage. Quality of the shrimp was determined by organoleptic tests and by objective tests of total volatile basic nitrogen, trimethylamine, dimethylamine, ammonia, volatile acids, volatile reducing substances, redox potential, α-amino nitrogen, hypoxanthine, total bacterial count, psychrophilic bacteria, and anaerobic bacteria.

The results indicated that the shelf life at 0° C. of brown shrimp could be extended by at least 12 days by gamma irradiation; optimal dose was 0.1 Mrad. When irradiation doses of 0.3 Mrad or higher were used, the shrimp had unacceptable off-flavors. The total volatile basic nitrogen and ammonia values appeared to be reliable indices of spoilage of the irradiated shrimp.
[3 figures, 35 references] FTP

3.33 AN IMPROVED PRECOOK PROCESS FOR BLUE CRAB
(CALLINECTES SAPIDUS)

Tinker, Burton L., and Robert J. Learson (National Marine Fisheries Service, Atlantic Fishery Products Technology Center, Gloucester, MA 01930)
Chesapeake Science 13, No. 4, 331-333 (Dec. 1972)

Precooking is a necessary first step in the processing of blue crab to reduce bacterial count, facilitate removal of meat, and provide the characteristic crabmeat odor and flavor. Cooking crabs in steam or boiling water at 212° F. for 10 to 15 min. is common practice in most crabmeat processing plants. Blue crab meat is sensitive to heat, and biochemical changes due to cooking damage the product in color, texture, and reduced yield. Studies were made to find a process that would lessen the damage and provide a better quality product. Live crabs were placed in water containing 200 p.p.m. chlorine for 30 min. Two methods of cooking were used: steam at 212° F. for 15 min. and steam at 212° F. for 8 min.

Results of depuration in chlorine water indicated that bacterial count in crab meat had been reduced over 99%. Crabs subjected to steam at 212° F. for 8 min. after depuration had bacterial counts of less than 100,000 (bacteria per gram of meat) which is sufficient to meet public health standards. In addition, crabs treated in this manner gave a greater yield of meat which had better organoleptic quality than crab meat precooked for the longer period of time.
[4 tables, 5 references] SW

3.12 METHOD OF PREPARING FRESH UNCURED MEAT PRODUCTS

Oscar Mayer & Co. (J. C. Bard and F. C. Olson) (pat.)
U.S. Patent 3,679,434
Natn. Provis. 167, No. 11, 29 (1972)
Food R.A. Abstracts 26, No. 1, Abstract No. 341, 52 (Jan. 1973)

Slices or chunks of raw meat weighing approximately 8 ounces and a minimum thickness of approximately one inch are injected with a solution of edible polyphosphate salt, mechanically worked and the resulting exudate covered pieces are pressed together to give portions of predetermined size, shape and weight. It is said that by injecting the polyphosphate solution rather than coating the meat with it, rancidity development in the cooked meat product is retarded. Reprinted

3.15 (3.63) DEHYDRO-IRRADIATION PROCESS FOR WHITE POMFRET (STROMATEUS CINEREUS): SYNERGISTIC EFFECTS OF BLANCHING WITH PRESERVATIVES, PARTIAL DEHYDRATION AND LOW DOSE IRRADIATION

Agarwal, S. R., U. S. Kumta, and A. Sreenivasan (Biochemistry & Food Technology Div., Bhabha Atomic Research Center, Bombay 85, India)
Journal of Food Science 37, No. 6, 837-840 (Nov.-Dec. 1972)

In India the white pomfret is mainly consumed fresh, but in seasons when high landings occur the fish is preserved by freezing. The pomfret is a medium fat content (5 to 8%) fish, and it is susceptible to oxidative changes during frozen storage. As a result, it readily becomes rancid and discolored. Earlier work with shrimp has demonstrated the beneficial preservative effects of a combination treatment with sorbic acid, drying to 40% moisture content, and irradiation at 0.25 Mrad. In the present work, the authors attempted to improve the keeping quality of white pomfret fillets at ambient temperatures by a combination treatment of blanching, addition of preservative, dehydrating to 35 to 40% moisture content, packaging, and irradiation. In this process, the fillets of white pomfret were heated in boiling brine (20% salt) containing 0.1% propyl paraben (or p-hydroxybenzoic acid) for 5 min., partially dried in air to a moisture content of from 35 to 40%, packaged under nitrogen atmosphere in pouches of 4-ply laminated paper/low density polyethylene/aluminum foil/ low density polyethylene, and then irradiated at 0.5 Mrad. The treated white pomfret fillets kept in satisfactory condition for 4 months at ambient temperature (quality evaluations were made in terms of bacteria and mold counts; trimethylamine and total volatile base levels; carbonyl acid 2-thiobarbituric acid values; appearance; and organoleptic scores).
[6 figures, 2 tables, 27 references] FTP

3.63 HERRING PROCESSING

Halstensen, H., and H. Hov (pat.)
British Patent 1,228,312
Food Technology 27, No. 2, 86 (Feb. 1973)

Fish are preserved in a brine containing enzyme-absorbing wood shavings. FTP

3.27 THAWING OF FROZEN FOODSTUFFS

Everington, D. W.
Chemy Ind., No. 35, 973-979 (1971)
BFMIRA Abstracts 25, No. 1, Abstract No. 236, 48 (Jan. 1972)

Thermal methods, which are dependent upon the thermal conductivity and thermal diffusity of the foodstuff, and methods dependent upon the electrical properties of the foodstuffs such as dielectric constant and specific resistance, are described and discussed with reference to the physics of thawing. Particular attention is paid to the recently developed vacuum heat thawing method and the results of pilot plant tests using fish, meat and fruit are reported. Other systems discussed are water thawing, air thawing, dielectric thawing and electrical resistance thawing. Cost figures are given which show that vacuum heat thawing compares favourably with other methods of thawing in terms of capital and running costs. In addition, the equipment employed in vacuum heat thawing is more easily cleaned than equipment used in methods such as air thawing, consequently the costs of stoppages for cleaning are considerably lower. C.C.E. Reprinted

3.12 FISH PROTEIN TREATMENT

Haarman & Reimer G.m.b.H. (pat.)
Japanese Patent 72/39705
Food Technology 27, No. 2, 86 (Feb. 1973)

Pieces of fresh fish are coated with a mixture consisting of a major proportion of a di- or triglyceride and minor amount of a monoglyceride of paraffinic or olefinic carboxylic acid having 8 to 24 carbon atoms. FTP

3.33 FISH CANNING APPARATUS

Mencacci, S. A.; International Machinery Corp., S.A. (pat.)
U.S. Patent 3,700,386
Food Technology 27, No. 2, 86 (Feb. 1973)

This can-filling equipment for fish includes a conveyor that advances fish fillets past a rotary cutter (which cuts fish into segments), and then advances the fish segments into a compression chamber. FTP

3.338 STORAGE TESTS WITH FISH PRODUCTS IN CHROMIUM-AND TIN-PLATED CANS

Hottenroth, Beatrix (Inst. Lebensmitteltechnol. Verpack., Tech. Univ. Muenchen, Munich, Germany)
Chemical Abstracts 77, No. 17, 112626e (Oct. 23, 1972)

3.12 (6.54) FISH PASTE PRODUCTS

Matsumoto, J. (pat.)
Japanese Patent 72/37020
Food Technology 27, No. 2, 86 (Feb. 1973)

Carboxylic acids and polyalcohols are added to fish paste products to prevent their denaturation during frozen storage. FTP

4.11 A SIMPLE, RAPID METHOD TO PROCESS AND ASSAY FATTY ACIDS AND ALCOHOLS BY GAS CHROMATOGRAPHY

Bricknell, Kenneth S., and Sydney M. Finegold (Infectious Disease Section, Wadsworth Hospital Veterans Administration Center, and the Dept. of Medicine, U.C.L.A. School of Medicine, Los Angeles, Calif.)
Analytical Biochemistry 51, No. 1, 23-31 (Jan. 1973)

Current procedures for preparation and assay by gas chromatography of short chain, volatile fatty acids and other metabolites of bacterial activity are time consuming. Poor recovery of isolates using the preparatory procedures has also been reported.

A simple, rapid method for direct qualitative and quantitative determination of metabolite was developed; in addition, a large number of samples can be assayed by the method in a minimum time. Samples to be assayed are acidified to about pH 2.0, allowed to stand at room temperature for 30 min., and centrifuged at 2,000 r.p.m. for 10 min. The supernatants are transferred to clean tubes for immediate assay or capped and stored at 4° C. for future assay.

A gas chromatograph with a thermal conductivity detector (TCD), and another gas chromatograph with a flame ionization detector (FID) were connected to one recorder. An electronic digital integrator quantified the peak signals from the FID. A spiral column 6 ft. long and 1/4 in. outside diameter (o.d.) packed with Resoflex was used with the TCD; a stainless-steel spiral column 6 ft. long and 1/8 in. o.d. by 0.093 in. ID packed with FFAP (a product of a reaction between Carbowax 20M and 2-nitroteraphthalic acid) on Porapak Q, 80-100 mesh, was used with the FID.

(over)

4.13 (8.53) COMPARATIVE STUDY ON THE STEROL COMPOSITION OF MARINE MOLLUSKS

Teshima, Shin-ichi, and Akio Kanazawa (Laboratory of Fisheries Chemistry, Faculty of Fisheries, University of Kagoshima, 470 Shimoarata-cho, Kagoshima, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1299-1304 (Nov. 1972)

To advance knowledge of the comparative biochemistry of mollusks, the sterol composition of 21 species of mollusks was determined. The species represented three different classes, five different orders, and 13 different families. Data on the sterol content are shown in the table that follows.

Cholesterol was the main sterol of the gastropods. C_{27}-, and C_{28}-sterols were also detected in the Murex asianus, Cymatiidae sp., Charonia sauliae, and Conomurex luhuanus. The plecypods contained relatively small amounts (as compared to the gastropods) of cholesterol and showed a very complex sterol composition. Liolophura japonica (a primitive mollusk) contained 7-cholesterol (Δ^7-sterol).

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4.13 STEROLS OF STARFISHES--II. THE PRESENCE OF CHOLESTANOL, $\Delta^{7.22}$-CHOLESTADIENOL AND A NEW C_{26} STEROL

Matsuno, Takao, Seiichi Nagata, and Keizo Hashimoto (Kyoto College of Pharmacy, Yamashina, Higashiyamaku, Kyoto, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1261-1265 (Nov. 1972) (In Japanese; figures, table, and abstract in English)

In an earlier paper in this same journal [38, 144-147 (1972)], the authors reported the sterol constituents of six species of starfish. Δ^7-Cholestenol was the major sterol constituent; other sterols present were $\Delta^{7.22}$-ergostadienol, $\Delta^{7.22}$-stigmastadienol, Δ^7-stigmastenol, and the C_{28} sterol, stellastenol. The present paper reports on the identification of two sterols that were not identified in the previous study. These two sterols turned out to be cholestanol and $\Delta^{7.22}$-cholestadienol. Also, another sterol appearing in all six species of starfish was tentatively identified as 24-nor-$\Delta^{7.22}$-cholestadienol.
[4 figures, 1 table, 8 references]

FTP

4.5 POSSIBLE MECHANISMS OF AUTOXIDATIVE RANCIDITY

Loury, M. (Institut des Corps Gras, Paris, France)
Lipids 7, No. 10, 671-675 (Oct. 1972)

The purpose of this work was to try to obtain new information on the mechanisms of fat autoxidation. In order to obtain reliable results, the researcher used nearly pure fatty acids. The autoxidation of nonanal was also studied, because of the possibility that saturated aldehydes with 8 to 11 carbon atoms could be produced from scission or further changes of the primary oleic hydroperoxides.

The autoxidizable materials (oleic acid and nonanal) were dispensed as thin film on glass wool fibers. The glass wool containing the material was placed in a U-tube and purified air at constant temperature was passed through the tubes. The exiting air was passed through a dry-ice trap (-60° C.) to condense the volatile autoxidation products, and then was bubbled through aqueous barium hydroxide to detect and measure the carbon dioxide. The volatile compounds were fractionated and identified by chromatographic analysis.

The volatile products that were identified from autoxidized oleic acid and nonanal are shown in the table that follows.

(over)

4.13 THE COMPOSITION OF TRIGLYCERIDES AND CHOLESTERYL ESTERS IN SOME FISH OILS OF SALT, BRACKISH AND FRESH WATER ORYGINS [sic]

Ikekawa, Nobuo (Laboratory of Chemistry for Natural Products, Tokyo Institute of Technology, Ohokayama, Meguro-ku, Tokyo, Japan), Masami Matsui, Tamao Yoshida, and Takeshi Watanabe

Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1267-1274 (Nov. 1972)

The triglycerides and cholesteryl esters of oils from six species of fish were analyzed by gas chromatography after preliminary separation by thin-layer chromatography. The six species of fish were basking shark Acipenser mikadoi and sardine Sardinops melanosticta (salt-water fish), carp Cyprinus carpio, "yamame" a landlocked trout Oncorhynchus masou, and rainbow trout Salmo irideus (fresh-water fish), and the eel Anguilla japonica (brackish water fish). In general, the triglycerides in the fish oils contained an even number of carbon atoms (C-even), from C_{30} to C_{60}, and a small amount of triglycerides contained an odd number of carbon atoms (C-odd). The fresh-water fish oils contained mainly C-even triglycerides from C_{40} to C_{60}; the salt-water fish oils contained C-even triglycerides from C_{30} to C_{60}. Oils from the salt-water fish contained, characteristically, a predominance of the C-odd triglycerides over the C-even triglycerides below C_{45}; the C-even triglycerides were predominant above the C_{45}.

The cholesteryl esters in the oils of the fresh-water fish were mainly the C_{16} and C_{18} esters; those in the oils of the salt-water fish were mainly C_{14} to C_{26} esters.

[9 figures, 10 references] FTP

4.5

Product class	Products identified from oxidized: Oleic acid	Nonanal
n-Aldehydes	C_2; C_3; C_4; C_5; C_6; C_7; C_8; C_9; C_{10}	C_6; C_7; C_8; C_9
n-Alcohols	C_5; C_6; C_7; C_8	C_6; C_7; C_8
n-Alkylformates	C_2; C_3; C_4; C_5; C_6; C_8	C_6; C_7; C_8
n-Hydrocarbons	C_6; C_7; C_8	C_6; C_7; C_8

The recurrent reactions of autoxidation that give rise to volatile products are represented as follows:

$$\begin{array}{ccccccc} & & H\text{-}CO_2H & & H\text{-}CO_2H & & H\text{-}CO_2H \\ & & \uparrow & & \uparrow & & \uparrow \\ P \rightarrow & a_n & \rightarrow & a_{n-1} & \rightarrow & a_{n-2} & \rightarrow \text{(etc.)} \\ & \downarrow & & \downarrow & & \downarrow & \\ & A_n & & A_{n-1} & & A_{n-2} & \end{array}$$

where P = Hydroperoxide of oleic acid
A_n = Aldehyde of scission (octanal, nonanal, or decanal)
a_n; a_{n-1}; a_{n-2} = Aldehydes (lower homologs of a_n)
A_n; A_{n-1}; A_{n-2} = Acids
n = number of carbon atoms.

The author concludes that autoxidative rancidity is a succession of reactions between free radicals having varied life spans, and produces volatile products which are often offensive in taste and odor. He describes some possible reaction pathways.

[4 figures, 1 table, 18 references] FTP

4.11

After a warmup period of 15 to 20 min. the recorder and instruments were electrically balanced. An aliquot of standard mixture was injected into the TCD instrument. When retention time was confirmed, the recorder was switched to the FID and the standard mixture was injected into the FID system for confirmation.

Digital integrator quantitation was determined by using standard aqueous solutions of short chain fatty acids to establish a factor for each. The factor was used to calculate the concentration of a component found in a sample.

The method has proven to be reliable and accurate for the determination of metabolic end products in bacterial cultures and biological specimens. Total time for each test was about 20 min.

[3 figures, 1 table, 8 references] SW

4.13 (8.53)

Species of mollusk	Sterol content of the fresh marine mollusks: Lipids	Unsap. material	Sterols
	%	%	%
L. japonica	0.85	0.11	0.070
H. gurneri	1.27	0.87	0.091
C. nigrisquamata	4.50	0.19	0.116
C. nigrolineata	1.9	0.21	0.10
P. saccharina	3.0	0.20	0.13
M. labio	2.0	0.48	0.13
T. maximus	2.4	0.11	0.07
T. maculatus	2.3	0.38	0.20
A. haematragum	2.5	0.22	0.16
T. cornutus	4.5	0.19	0.12
C. luhuanus	2.1	0.23	0.22
P. arabica	2.5	0.80	0.09
R. captserpentis	0.81	0.53	0.04
C. sauliae	3.0	0.57	0.09
Cymatiidae sp.	2.1	0.28	0.15
M. asianus	1.7	0.87	0.20
P. bronni	1.9	0.18	0.10
P. trapezium	1.3	0.21	0.15
A. pectinata	2.7	0.17	0.10
M. edulis	1.9	0.47	0.21
T. phillippinarum	1.5	0.50	0.06

[3 tables, 21 references] FTP

4.14 COMPARISONS OF SPERM OIL-BASED E.P. [EXTREME PRESSURE] ADDITIVES WITH THEIR REPLACEMENT PRODUCTS

Thompson, P. F. (Kell Chem. Co., Inc., United States)
Chemical Abstracts 77, No. 24, 154244j (Dec. 11, 1972)

4.61 (6.54)

ANTIOXIDANT EFFECT OF PROTEIN HYDROLYZATES IN A FREEZE-DRIED MODEL SYSTEM

Bishov, S. J., and A. S. Henick (Food Lab., Food Chemistry Div., U.S. Army Natick Lab., Natick, MA 01760)
Journal of Food Science 37, No. 6, 873-875 (Nov.-Dec. 1972)

Only a few antioxidants have been approved for food use; the primary ones are phenolic substances, synthetically produced. The use of synthetic antioxidants is being questioned by consumers, and nordihydroguariaretic acid (NDGA), for example, has been removed from the approved list. Interest in the search for natural antioxidants has increased, and certain workers have already demonstrated antioxidant activity in proteinaceous materials such as amino acids, linoleate salts of lysine and arginine, and hydrolyzed vegetable protein (HVP). The present study was carried out to determine the effectiveness of protein hydrolyzates, autolyzed yeast protein (AYP), and HVP as antioxidants and, if possible, to identify the active agents. AYP and HVP were selected for this initial study because of their ready availability.

The AYP and HVP were fractionated by a series of molecular sieves into three fractions of molecular weight: <700, between 700 and 1,500, and >1,500. A nucleotide-rich fraction was separated from AYP by an alcohol extraction, ion-exchange procedure. Antioxidant-free corn oil in a freeze-dried model system containing a carboxy-methyl-cellulose (CMC) matrix was used. The model system was prepared by adding in succession 50 ml. of water, the antioxidant test material in the required amounts, 1 g. of CMC, and 1 g. of corn oil. The mixture was blended, transferred to a 250-ml. round bottom flask, shell frozen, and then freeze

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6.54 (0.6)

FORTIFYING SOFT DRINKS WITH CHEESE WHEY PROTEIN

Holsinger, V. H., L. P. Posati, E. D. DeVilbiss, and M. J. Pallansch (Dairy Products Laboratory, Agricultural Research Service, U.S. Dept. of Agriculture, Washington, DC 20250)
Food Technology 27, No. 2, 59-60, 64-65 (Feb. 1973)

Carbonated beverages consist primarily of water, sugar, flavoring, and carbon dioxide. Better nutrition, particularly of children, could be achieved by fortification of soft drinks with valuable nutrients without detectable change in flavor or appearance. Proteins from cheese whey possess functional properties that may make them suitable for fortifying carbonated soft drinks. In this work, dried cottage cheese whey concentrate was added to carbonated beverages. The results of these solubility and stability studies indicated that carbonated soft drinks can be successfully fortified with cheese whey proteins. The success of such fortification of soft drinks, however, depends upon whether cheese whey proteins can be concentrated undenatured at a reasonable cost.

[6 figures, 4 tables, 14 references] FTP

6.137

FRACTIONAL VACUUM DISTILLATION OF HERRING OIL METHYL ESTERS

Ackman, R. G., P. J. Ke, and P. M. Jangaard (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the American Oil Chemists' Society 50, No. 1, 1-8 (Jan. 1973)

The methyl esters of oil from the herring (Clupea harengus) were fractionally distilled under vacuum (batch basis and pilot plant scale) to find out if fractions of defined fatty acid compositions could be obtained that were of industrial use. Sixty-four methyl ester fractions were collected and analyzed by gas-liquid chromatography. Good yields were obtained of the short chain polyunsaturated fatty acids, but yields of 60% or less were obtained for long chain highly unsaturated acids due to their oxidation and thermal decomposition in the apparatus used. Recoveries of the major saturated and monounsaturated acids were excellent (about 100%). Assuming small amounts of unsaturated acids are acceptable, fractional distillation of low iodine value marine oils could inexpensively supply fractions with high levels of long chain methyl esters (C_{20} and C_{22}) monounsaturated and shorter chain (C_{14}) saturated, or (C_{16}) saturated-monounsaturated mixtures.

[3 figures, 3 tables, 27 references] FTP

7.42

A RAPID METHOD OF PREPARING FOOD FOR SODIUM AND POTASSIUM ANALYSES

Spitzer, Mary E., Charles Ritchey, James M. Glennon, Ysidro Villarreal, and Arthur D. Mason, Jr. (U.S. Army Institute of Surgical Research, Brooke Army Medical Center, Fort Sam Houston, Texas)
Journal of the American Dietetic Association 62, No. 1, 44-46 (Jan. 1973)

Food composition tables only provide estimates of the sodium and potassium content of foods. A dietitian involved in developing, preparing, and serving diets of precisely prescribed sodium and potassium levels should have the actual content defined by quantitative analysis. But, present methods of preparing foods for sodium and potassium analyses require considerable time. These methods involve digestion of the food with acid (wet ash) or burning the sample to an ash (dry ash). In this article, the authors present a method for preparing foods for analysis of sodium and potassium by flame photometry that can save up to 50% in time.

The method is as follows: Ten grams of the food sample and a quantity of deionized water are homogenized in a homogenizing flask. Liquid foods and butter are first dried at 110° C. to a constant weight. The food is homogenized at 45,000 r.p.m. for 20 min. while the homogenizing flask is held in ice. A portion of the homogenate is transferred quantitatively to a 250 ml. volumetric flask and made up to volume with deionized water. An aliquot is poured into a centrifuge tube and the tube and contents are centrifuged at 2,000 r.p.m. for 20 min. The

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6.35 CARRAGEENAN

Anonymous
Food Technology 27, No. 2, 79-80 (Feb. 1973)

Carrageenan is the natural product extracted from seaweed. It is extracted by cooking the seaweed in water. The water extract is then purified, decolorized, and dried to yield an active carrageenan in a ready-to-use, dry form. It is used as an emulsifier, stabilizer, and thickener in various foods such as ice cream and related dessert products, evaporated milk, puddings, low calorie foods, beverages, formulated baby foods, and others. Its level of use in food products ranges from 0.005% to 1.2%. The estimated daily ingestion per individual ranges from 0 to 1.5 g.--far below the acceptable level of 3.5 g. recommended by the FAO/WHO Expert Committee on Food Additives. Carrageenan was included on the first GRAS (Generally Recognized as Safe) list by the U.S. Food and Drug Administration on Nov. 20, 1959. The results of an independent private research laboratory, using the traditional 100-fold safety factor, indicated that no evidence of human hazard exists at the present levels of usage of carrageenan.

A chemically modified form of carrageenan (known as C-16) was developed in Europe and was used only in Europe in a pharmaceutical preparation for treatment of peptic ulcers. In a research study carried out by a medical college in New York, it was found that C-16 caused undesirable changes in the rectal areas of test rats. Thus use of C-16 in foods in the United States is banned. FTP

7.42

supernatant solution is filtered, and the filtrate is then analyzed for sodium and potassium by flame photometry.

This new method of sample preparation requires much less time than the regular wet ash and dry ash procedures. Analytical results can be obtained in 4 hr. when the drying procedure is used and in 1 hr. when the drying procedure is not used. The dry ash method requires a minimum ashing time of 8 hr., while the wet ash method may require as much as 2 weeks to digest the foods.
[1 table, 9 references] FTP

7.42 SIMPLE METHOD FOR THE ACTIVATION ANALYSIS OF MERCURY IN FISH BY USING IODINATED RESINS

Montoloy, F., M. Heurtebise, and J. Lubkowitz (Dep. Technol. Nucl., Inst. Venez. Invest. Cient., Caracas, Venezuela)
Chemical Abstracts 77, No. 17, 112578r (Oct. 23, 1972)

4.61 (6.54)

dried. The flask was stoppered and held at 65.5° C. The oxygen level in the headspace was determined at periodic intervals by gas chromatography; the end of the induction period was taken, arbitrarily, when 50% of the original oxygen in the headspace was consumed. AYP, HVP, and their hydrolysates were used alone and in combination with α-tocopherol and butylated hydroxyanisole (BHA).

Both AYP and HVP showed antioxidant activity. All fractions had antioxidant activity; those in the molecular weight range below 700 and those between 700 and 1,500 had greater activity than did those between 1,500 and 5,000. The maximum antioxidant effect of the hydrolysates was at about the 25% level (oil basis). The most active hydrolysate fraction increased the induction period by a factor of 10. A synergistic effect was noted in the combined effects of AYP with α-tocopherol or BHA.
[2 figures, 4 tables, 13 references] FTP

6.54 CONCENTRATED FISH PROTEINS. TRENDS IN PAST AND FUTURE

Doesburg, J. J., and J. Bon (IJmuiden, Netherlands)
Chemical Abstracts 77, No. 17, 112521s (Oct. 23, 1972)

7.0 ADVANCED ANALYTICAL INSTRUMENTATION

Leslie, R. C. (Perkin-Elmer Ltd., Beaconsfield, Bucks., England)
Food Manufacture 47, No. 11, 41, 43, 46 (Nov. 1972)

The author describes some of the more advanced analytical instruments which combine a high degree of automation with great precision and discusses the principles on which they are based. The analytical instruments were classified into two categories; (1) those which separate mixtures and (2) those which identify single components or measure a physical property that can be related to chemical or physical structure of the component. The instrumentation used in the first category includes gas-liquid and liquid-solid chromatography. The second category involves radiation techniques of molecular absorption, atomic absorption, infrared absorption, and resonance and fluorescence radiation. Other techniques discussed are thermal and elemental analyses.
[2 illustrations] FTP

7.51 COLORIMETRIC METHOD FOR THE ESTIMATION OF PROTEIN NITROGEN IN FISH FLOUR AND FISH MEAL (6.54)

Misra, K. C., and K. K. Saroj (Reg. Res. Lab., Bhubaneswar, India)
Chemical Abstracts 77, No. 3, 18133v (July 17, 1972)

7.42 "COLD VAPOR" METHOD FOR DETERMINING MERCURY

Kopp, John F., Mary C. Longbottom, and Harry B. Lobring (Analytical Quality Control Laboratory, Environmental Protection Agency, Cincinnati, Ohio)
Journal of the American Water Works Association 64, No. 1, 20-25 (Jan. 1973)

In this method for determining mercury, the mercury in the sample is reduced in aqueous solution with stannous sulfate. A stream of air is bubbled through the solution; the airstream carries the mercury vapor into a flow-through absorption cell positioned between a source of 253.7-nm. wavelength light and a detector. The amount of absorption of light is proportional to the concentration of mercury. The method can be used on potable water, surface water, and various industrial (including sewage-treatment plant) effluents. Prior to mercury determinations fish tissues are processed according to the method of J. F. Uthe, F. A. J. Armstrong, and M. P. Stainton [Journal of the Fisheries Research Board of Canada 27, 805 (1970)].
[1 figure, 5 tables, 18 references] FTP

8.51 PRESENCE OF TAURINE IN THE EXTRACT OF HARD CLAM

Watanabe, Katsuko, and Shoji Konosu (Laboratory of Marine Biochemistry, Faculty of Agriculture, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1311 (Nov. 1972)

In 1970, other workers reported that the hard clam Meretrix lusoria was lacking in taurine, but other mollusks contained it. In the present study, the authors isolated and confirmed the presence of taurine in the hard clam.
[1 figure, 6 references] FTP

7.62 GAS CHROMATOGRAPHIC ESTIMATION OF THIAMINE

Dwivedi, Basant K., and Roy G. Arnold (Dept. of Food Science and Technology, University of Nebraska-Lincoln, Lincoln, NE 68503)
Journal of Food Science 37, No. 6, 889-891 (Nov.-Dec. 1972)

The present chemical, biological, and microbial methods for vitamin analysis are too complex and time consuming for routine quality control applications. This paper describes a simple gas-liquid chromatographic method for estimating the amount of thiamine in food products and pharmaceutical preparations. The thiamine is extracted by refluxing the sample in 0.1 N HCl, followed by enzymatic hydrolysis with Takadiastase or Mylase-P. The thiamine solution is incubated in the presence of bisulfite at pH 6.0; thus the extracted thiamine is quantitatively cleaved into 4-methyl-5-(ß-hydroxyethyl) thiazole and a pyrimidine moiety. The 4-methyl-5-(ß-hydroxyethyl) thiazole is extracted with chloroform/methanol solvent, and is converted into its trimethylsilyl (TMS) derivative by adding BSA (N,O-Bis [trimethylsilyl acetamide]). The TMS derivative is analyzed by gas-liquid chromatography using a flame ionization detector.
[3 figures, 6 references] FTP

8.59 PIGMENTED CALCAREOUS SKELETONS OF SOME CORALS

Fox, Denis L. (Scripps Institution of Oceanography, University of California, La Jolla, CA 92037)
Comparative Biochemistry and Physiology 43, No. 4B, 919-927 (Dec. 15, 1972)

The chemical characteristics of colored molecules in the tissues of many animals, and their wide occurrence are well known. There is less information available on several of these molecules (or pigments) which have been deposited in the skeletons of the sessile, colonial animals such as coelenterates (corals) and bryozoans [small, tufted organisms connected to each other in a colony covered with secreted gelatinous chitinoid or calcareous film].

Tests on the following coral skeletons were performed to identify their color chemically.

Order	
Stolonifera:	Tubipora musica (the red organ-pipe coral)
Gorgonacea:	Adelogorgia phyllosclera (pink-purple)
	Muricea californica (orange to brick-red)
	Lophogorgia chilensis (slender salmon-pink branches)
	Corallium rubrum (deep orange-red precious coral)
Hydrocorallina:	Stylaster roseus (purple)
	Stylaster elegans (pink and orange)
	Stylaster sanguineus (pale pink)
	Distichopora coccinea (vermilion)

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7.51 QUANTITATIVE ASSAY FOR SUBMICROGRAM AMOUNTS OF PROTEIN

Goldberg, Melvin L. (Dept. of Pathology, University of California, San Francisco, Calif.)
Analytical Biochemistry 51, No. 1, 240-246 (Jan. 1973)

A colorimetric method for the determination of protein is described that is 500 times more sensitive than the common method reported by O. H. Lowry, N. J. Rosebrough, A. L. Farr, and R. J. Randall [J. Biol. Chem. 193, 265 (1951)]. The results are linear between 0.01 and 0.2 µg. protein.

In this assay copper is complexed to protein. The copper reagent consists of a mixture of sodium hydroxide (2.2 N), cupric sulfate (0.022 M), and sodium potassium tartrate (0.044 M). Concentrated NaOH is added to the protein (1% bovine serum albumin solution) to make the equivalent of a 0.1 N NaOH solution. The copper reagent is added to the protein solution and incubated for 15 min. at room temperature. Excess copper is removed by passing the reaction mixture through a very small, fast-flowing Sephadex column. The fluid collected from the column contains the copper protein complex. The protein in the complex is digested with the addition of hydroperoxide and incubation for 90 min. at 25° C. The mixture is then boiled for 1 hr. A reagent consisting of phenol prepared with NaOH and a 10% chloramine-T solution in KOH is added to the digested protein copper complex. The color reaction between the two reagents, catalyzed by copper, occurs at pH 11.4 to 11.8. Absorption in a photospectrometer is read at 410 nm. against water; the water reading is subtracted from the copper catalyzed color reading. Protein inhibits the color producing copper catalyzed reaction between phenol and chloramine-T; thus, the concentration of color is proportional to the protein-copper which passed through the Sephadex column.
[1 figure, 1 table, 7 references] SW

8.59

Examined under near ultraviolet light, none of these skeletons exhibited fluorescence except S. elegans, whose pink parts showed orange fluorescence. Bits of the skeletons of the gorgonia were treated with dilute acetic acid to dissolve the material with evolution of CO_2. The resulting solution was colored but no pigment was extractable with hexane or chloroform, indicating that carotenoids and porphyrins were not present.

The only stolonifera tested was digested with Na_2EDTA (no other identification). The resulting suspension showed no spectroscopic absorption bands, no color change in acid or alkaline conditions, and under near ultraviolet illumination, gave a dark green fluorescence. There was no recoverable color in hexane extractions of the digest. Treatment of the skeleton with either dilute acetic acid followed by hexane extraction, or hot KOH yielded no pigment.

Skeletons of the hydrocorallina ground and treated with Na_2EDTA gave a colloidal solution that was extracted with hexane and then ethanol. Pigment that migrated to the hexane layer exhibited an absorption maximum typical of astaxanthin. Further treatment with NaOH converted the astaxanthin to the red disodium soap astacene. All four species yielded the carotenoid astaxanthin. In addition, S. elegans contained xanthophyll.

Based on his earlier work the author speculated that coral skeletons contain, in addition to pigments, other organic compounds such as palmitic, stearic, and fluorescent chromolipid acids.
[14 references] SW

7.42 (6.133) THE ANALYSIS OF ORGANICALLY BOUND ELEMENTS (As, Se, Br) AND PHOSPHORUS IN RAW, REFINED, BLEACHED AND HYDROGENATED MARINE OILS PRODUCED FROM FISH OF DIFFERENT QUALITY

Lunde, Gulbrand (Central Institute for Industrial Research, Forskningsvn. 1 Blindern, Oslo 3, Norway)
Journal of the American Oil Chemists' Society 50, No. 1, 26-28 (Jan. 1973)

The purpose of this work was (1) to determine how the selenium, arsenic, phosphorus (that is, phospholipid), and bromine contents of fish oils varied when produced from fish in different stages of quality (from fresh to spoiled) and (2) to examine how the levels of these elements may vary in these oils during their alkali-refining, bleaching, and hydrogenation processes. Herring and mackerel were used. The fish were stored until they became quite spoiled. Oil was extracted from samples of the fish at periodic intervals of storage. The quality condition of the fish was characterized by tests for total volatile nitrogen in the raw tissue and the free fatty acid content of the extracted oil. The oils were then refined under laboratory conditions using a nickel catalyst. The various oils at various stages of treatment were analyzed for As, Se, Br, and P.

When the raw fish deteriorates during storage, there is an increase in the Se and P contents of the oils prepared from these fish, but the As and Br content of the oils remains nearly the same. When the oils are refined, their As and P content almost completely disappears, but the Se content is reduced to about two-thirds the original level and the Br content remains unaffected. The Se disappears relatively fast and the Br relatively slowly during the hydrogenation process of the oils. Both the selenium and the bromine organic compounds in marine oils seem to inactivate the catalyst during the hydrogenation of fish oils.
[2 figures, 2 tables, 5 references] FTP

8.59 (8.46) THE PRESENCE OF VOLATILE, NONPOLAR BROMO ORGANIC COMPOUNDS SYNTHESIZED BY MARINE ORGANISMS

Lunde, Gulbrand (Central Institute of Industrial Research, Forskningsv. 1, Blindern, Oslo 3, Norway)
Journal of the American Oil Chemists' Society 50, No. 1, 24-25 (Jan. 1973)

In earlier work, the author demonstrated the presence of lipid soluble bromo organic compounds in marine oils. In the present study, he demonstrated the presence of volatile, nonpolar bromine-containing compounds in marine organisms. The materials examined were cod liver oil; cod fillet; cod liver; mackerel fillet; halibut fillet; capelin, whole fish; herring, whole fish; mussel, whole animal; and seaweed, whole plant. In tissues containing high fat content, the volatile, nonpolar bromine containing compounds represented about 0.1 to 1.0% of the total amount of bromo organic compounds present in the marine oils. In the tissues of low fat content, a higher level of bromo organic compounds was found. These bromo organic compounds are probably synthesized in one or more stages in the food chain. The author believes that most of the bromine-containing compounds will probably pass the usual methods of sample clean-up employed in analysis for chlorinated hydrocarbons in the environment, and they will be detected by electron capture gas chromatography. There is the possibility, therefore, of their being mistakenly identified as pollutants with long biological half lives. Also, because of the ubiquitous occurrence of these brominated hydrocarbons among all classes of organic compounds, it appears that their mechanism(s) of formation is not very specific and that chlorine may be incorporated as well.
[1 table, 3 references] FTP

9.10 (2.146) AN ACOUSTIC DATA ACQUISITION SYSTEM FOR RESEARCH ON PELAGIC FISH SCHOOLS

Holliday, D. V. (University of California, San Diego Marine Physical Laboratory, Scripps Institution of Oceanography, San Diego, CA 92152)
MPL Technical Memorandum 237, University of California, San Diego, Marine Physical Laboratory of the Scripps Institution of Oceanography, San Diego, CA 92152 (Oct. 31, 1972), 110 pp.

In an earlier report the author dealt with the use of acoustics as a tool to assist in the remote identification of schools of commercially important marine fish. The results of direct biological sampling were combined with theoretical predictions for acoustic resonant swimbladder response and compared with experimentally observed resonances. The motions observed were divided into two groups: the track and swimming speed of the school was interpreted in terms of cruising speed; and the magnitude and duration of high-speed swimming bursts was interpreted to give estimates of the average fish length in the school. Internal school dynamics were investigated acoustically to observe echo frequency distribution. Frequency distribution was interpreted as resulting from doppler shifts due to motion in the school. The doppler shifts were divided into those caused by body- and tail-related swimming motions, near side aspects, and those related to behavioral swimming characteristics, near tail or head aspect. Side aspect data were used to estimate fish length. Tail and head aspect data were correlated with echo level, school dimensions, and school swimming speed to demonstrate that the

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9.11 DEEP-SEA BENTHIC COMMUNITY RESPIRATION: AN IN SITU STUDY AT 1850 METERS

Smith, K. L., Jr., and J. M. Teal (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 19, No. 4070, 282-283 (Jan. 19, 1973)

Organisms inhabiting the deep sea live in an environment of low food supply and high pressure. Reports from other work lead to the conclusion that deep-sea organisms will show decreasing oxygen uptake as depth increases with concomitant pressure rise. To study oxygen uptake as a measure of metabolism in this environment, tests were performed in situ on undisturbed benthic communities. Bell jars, which were equipped to measure oxygen consumption, were placed on the sediment, enclosing an area of 48 $cm.^2$. The jars were placed from the deep-sea research submersible Alvin at a depth of 1,850 m. Measurements of oxygen uptake were made over a period of 48 to 72 hr.; in this time the oxygen concentration was reduced 12 to 18%. Formaldehyde was injected into the jars to poison the biological oxygen demand. After the addition of formaldehyde, no residual oxygen uptake was detected. Under these conditions, the lack of residual oxygen uptake indicates that the measured uptake was due to biological activity, and it suggests that the accumulation of biologically oxidizable matter is negligible.

The oxygen concentration of the bottom water was 7.15 ml. per liter at 4.5° C. The mean value of 10 measurements of total oxygen uptake was 0.50 (±0.03) ml. per square meter (of sediment area) per hour. This uptake is two orders of magnitude lower than values calculated from data of shallow depths. The authors conclude that metabolic activity of deep-sea communities is low.
[1 table, 13 references] SW

9.12 (1.23) POPULATION STRUCTURE AND MOVEMENTS OF ATLANTIC MENHADEN (BREVOORTIA TYRANNUS), AS INFERRED FROM BACK-CALCULATED LENGTH FREQUENCIES

Nicholson, William R. (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516)
Chesapeake Science 13, No. 3, 161-174 (Sept. 1972)

The Atlantic menhaden is an important link in the food chain that supports predatory food fishes. Ranging from off central Florida to the Gulf of Maine, it also supported a large fishmeal and oil industry until the menhaden population declined drastically in the 1960's.

As part of a continuing program, catches of Atlantic menhaden were sampled for age and length at reduction plants from Florida to Massachusetts. For the years 1955 to 1964, lengths at the time of the first annulus formation were back-calculated from age-1, -2, and -3. Length frequency distributions, derived from monthly and seasonal totals, were plotted for the year classes. Meristic data on population structure were reviewed. General conclusions drawn from supporting data were (1) mixing of menhaden of all ages from all areas occurs south of Cape Hatteras, N.C., during the winter, (2) at the time of first annulus formation in early spring, age-1 menhaden segregate by size along the coast (the size of fish increases along the coast from south to north), (3) all menhaden do not return to the same area they occupied the previous year, (4) for normal year class, recruitment into the fishable population may not be complete until late in the second summer of life (age-1); for exceptionally large year classes recruitment may not

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9.13 (0.35) STUDIES ON METABOLISM OF FATTY ACID IN FISH--II. COFACTORS EFFECTING β-OXIDATION SYSTEM OF FATTY ACID IN CARP HEPATOPANCREAS MITOCHONDRIA

Murata, Hisashi, and Masamichi Toyomizu (Lab. Fish. Tech., Fac. Agr., Kyushu Univ. Fukuoka, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 11, 1293-1298 (Nov. 1972) (In Japanese; figures, tables, and abstract in English)

This paper reports on the cofactors that may affect the activity of the β-oxidation in carp (Cyprinus carpio) hepatopancreas mitochondria. Having found that carnithine, CoA, ATP, and Mg^{++} accelerated the O_2 uptake, the authors devised an improved medium to further study the β-oxidation system.

In the improved medium, the O_2 uptake in the carp hepatopancreas mitochondria was 4.7 times that found when using the original medium; however, the endogenous respiration remained unchanged. When CoA and carnitine was eliminated from the improved medium, there was a considerable decrease in the O_2 uptake. This suggested that the activation of fatty acids and the permeation of the activated acids through the membrane are probably the initial stages of the β-oxidation phenomenon. The O_2 uptake in the improved medium was not affected until the sample of mitochondria was left at 0° C. for 12 hr.
[2 figures, 2 tables, 13 references] FTP

9.11 CONCENTRATION OF SUSPENDED PARTICULATE MATTER IN SURFACE SEA WATER

Chester, R., and J. Stoner (Dept. of Oceanography, The University, Liverpool, L69 3BX, England)
Nature 240, No. 5383, 552, 553 (Dec. 29, 1972)

The kind and amount of suspended particles in the World Ocean is related to geological, geochemical, and environmental problems. Reports from other workers on particulate matter in sea-water report concentrations that are at variance from each other in the order of one or two magnitudes.

A study was conducted to determine the particulate matter encountered by a merchant ship enroute to Japan from Britain and return. Collections were made by pumping surface sea water from a position at the ship's bows through a 0.45-µm. membrane filter of known weight. The filter was washed with distilled water until salt free, dried at 60° C. to constant weight, and the weight of particulate matter determined.

The average amount of suspended matter along the margins of the eastern North Atlantic Ocean during April and July was 467 µg. per liter. In the open ocean of the South Atlantic during April and July, the average was 150 µg. per liter. The content of suspended material in waters from near-shore localities ranged between 84 and 2,609 µg. per liter. In marginal seas such as the Japan Inland Sea, the average concentration was 1,500 µg. per liter.

Various factors alter the concentration of suspended matter in sea water. Particles from organisms fluctuate seasonally and are concentrated in areas where upwelling occurs; river runoff affects the amount of inorganic suspended matter in near-shore areas.

[1 figure, 1 table, 7 references] SW

9.13 [PARASITIC COPEPODS FROM THE FISHES OF TUNISIA] COPEPODES PARASITES DES POISSONS DE TUNISIE

Raibut, André, Oum Kalthoum Ben Hassine, and Kalthoum Maamouri (Laboratoire de Biologie Marine, Faculté des Sciences, Tunis)
Bulletin de L'Institut National Scientifique et Technique D'Océanographie et de Pêche 2, No. 2, 169-197 (1971) (Republic of Tunisia)

This article lists the parasitic copepods from the fishes of Tunisia. The list comprises 15 species belonging to 8 families and 11 genera.

[62 figures, 64 references] FTP

9.1 BIOLOGICAL STUDY ON OVULATION IN VITRO OF FISH. III. INDUCTION OF IN VITRO OVULATION OF ORYZIAS LATIPES OOCYTES USING SALMON PITUITARY CONADOTROPIN

Hitose, Keiji, and Edward M. Donaldson (Ocean Res. Inst., Univ. Tokyo, Tokyo, Japan) Chemical Abstracts 77, No. 17, 109650c (Oct. 23, 1972)

9.10 (2.146)

observed doppler effects could have resulted from unique swimming behavior and thus related to fish identity or signature.

To control the complexity of the data acquired, a data acquisition system was necessary. The author put together a system consisting of a computer, spectrum analyzer, spectrum averager, teletype with low-speed tape reader and punch, a high-speed tape reader and punch, four, single track digital cassette tape recorders, a plotter, and an eight channel analog multiplexer. This equipment was found useful in the study of the acoustic signatures of pelagic fish schools. The report lists the machines used and the routines for operation of each.

[4 figures, 14 references] SW

9.12 (1.23)

be complete until the beginning of the third summer (age-2), and (5) Atlantic menhaden constitute a single homogeneous population, rather than two or more subpopulations as previously hypothesized.

[7 figures, 4 tables, 13 references] SW

9.10 UNISEXUAL FISH: LABORATORY SYNTHESIS OF A "SPECIES"

Schultz, R. Jack (Ecology Section, Biological Sciences Group, University of Connecticut, Storrs, CT 06268)
Science 179, No. 4069, 180-181 (Jan. 12, 1973)

All female clones that were comparable to those of a wild unisexual "species" Poeciliopsis monacha-lucida (living in northwestern Mexico) were produced by hybridizing bisexual (gonochoristic) fishes. The unisexuals produced in the laboratory consistently gave birth only to female progeny for six generations.

[1 figure, 1 table, 11 references] FTP

9.12 A LIST OF THE FRESH AND SEA WATER FISHES OF GREECE

Ondrias, John C. (Zoological Laboratory, University of Patras, Greece) Hellenic Oceanology and Limnology (Period C) 10, 23-96 (1971) (Institute of Oceanographic and Fishing Research, Ministry of Culture and Sciences, Athens, Greece)

This work is a general survey of the fresh- and sea-water fishes of Greece. The scientific name for each species is given and the common name for most species is given in Greek.

[202 references] FTP

9.14 STUDIES ON THE UTILIZATION OF PETRO-YEAST AS DIET OF FRESHWATER FISH--I. THE DISTRIBUTION OF CHITIN DECOMPOSING BACTERIA IN DIGESTIVE TRACTS

Zenro, Minami, Masanao Kajita (Nagase and Co., Ltd., Amagasaki, Japan), and Susumu Hibino (Feed Dept., Zenkoren, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 9, 1013-1019 (Sept. 1972)

Yeast derived from metabolizing petroleum (petro-yeast) are characteristically high in chitin content. The ayu (Plecoglossus altivelis), carp (Cyprinus carpio), and rainbow trout (Salmo gairdneri) use petro-yeast in their feed with high efficiency. To elucidate such efficient utilization of petro-yeast by these fish, the distribution of chitin decomposing bacteria in their digestive tracts was examined.

Chitin decomposing bacteria were isolated in relatively high frequency. The proportion of chitin decomposing bacteria to total bacteria in the digestive tract was high in each species of fish. According to biochemical characteristics, most of the chitin decomposing bacteria were considered to belong to the genus Aeromonas. In contrast, chitin decomposing bacteria in the digestive tracts of marine fish were mainly under the genus Vibrio.

In further studies of utilization of feed, carp was determined to use petro-yeast most efficiently. The authors attribute the utilization efficiency to a high incidence of chitin decomposing bacteria in the digestive tract of the carp. [5 tables, 26 references] SW

9.16 (1.89) CRAYFISH FARMING IN THE UNITED STATES

Avault, James W., Jr. (Fisheries Division, School of Forestry and Wildlife Management, Louisiana State University, Baton Rouge, LA 70803)
Sea Grant Preprint, Center for Wetland Resources, Louisiana State University, Baton Rouge, LA 70803 (1972), 23 pp. Price not given.

This article is a reprint of a report presented at the First International Symposium on Freshwater Crayfish, Sept. 12-15, 1972, at Hinterthal, Salzburger Land, Austria.

This article is a brief summary of crayfish farming in the United States and covers the classification of the species, the biology of crayfish, parasites and diseases of crayfish, crayfishing areas, crayfish farming, and processing and marketing. It includes a partial list (58 names) of investigators involved in the study of crayfish resources in the fields of cultivation, commercial utilization, diseases and parasites, pesticides, ecology, food science, and physiology. In addition, there is a list of 34 registered Louisiana crayfish processing plants. [11 references] FTP

9.19 EFFECTS OF POLYCHLORINATED BIPHENYL ON MARINE PHYTOPLANKTON COMMUNITIES

Moore, Stanley A., Jr., and Robert C. Harriss (Dept. of Oceanography, Marine Laboratory, Florida State University, Tallahassee, FL 32306)
Nature 240, No. 5380, 356-358 (Dec. 8, 1972)

This article reports the first in situ bioassay of short term effects of polychlorinated biphenyl compounds (PCBs) on natural marine phytoplankton communities. The effect in situ of a range in PCB concentrations to photosynthetic radiocarbon uptake in the natural communities of phytoplankton were determined in experiments conducted in St. George Sound in the northeastern Gulf of Mexico near Franklin County, Fla., during August-November 1970 and February-April 1971. The most predominant group among the phytoplankton were the diatoms represented by the following genera: Cerataulina, Chaetoceros, Biddulphia, Eupodiscus, Leptocylindrica, Melosira, Nitzschia, Rhizosolenia, and Thalassionema. Dinoflagellates (Peridinium and Ceratium) were generally present. Data were obtained on the amount of uptake of radiocarbon by phytoplankton exposed to various concentrations of PCB relative to control populations. The PCB compounds tested were 2,4′-dichlorobiphenyl, Aroclor 1242, and Aroclor 1254. The two Aroclors are isomeric mixtures of pure chlorinated biphenyl and differ in their degree of chlorination. The effects of the PCBs were compared with that of p,p′-DDT.

DDT at 5 p.p.b. and 2,4′-dichlorobiphenyl at 7 p.p.b. inhibited phytoplankton radiocarbon uptake. The LC_{50} value for p,p′-DDT was 35 p.p.b.; that for 2,4′-dichlorobiphenyl was 30 p.p.b. Aroclor 1242 was toxic to phytoplankton at levels

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9.19 PCB CONTAMINATION FROM BOAT BOTTOM PAINT AND LEVELS OF PCB IN PLANKTON OUTSIDE A POLLUTED AREA

Jensen, S., and L. Renberg (Swedish Environmental Protection Board, Special Analytical Laboratory, Wallenberglaboratoriet, Lilla Frescati, 104 05 Stockholm 50, Sweden), and M. Olsson (Swedish Museum of Natural History, 104 05 Stockholm 50, Sweden)
Nature 240, No. 5380, 358-360 (Dec. 8, 1972)

Samples of zoo- and phytoplankton were collected in Stockholm Harbor in Sept.-Oct. 1971 and in June 1972 to determine if contamination of plankton might occur from the antifouling paint, containing PCB, used on the boat. The plankton samples were taken at various locations around the boat in a 0.1-mm. mesh net while the boat was moving at a speed of about 1 knot. The PCB level was determined in terms of the extractable fat because it was difficult to determine the true sample weight. Samples were also taken of stirred boat paint. The following table shows the PCBs in plankton taken at different points in relation to the boat.

Date of sample	PCB in plankton sample (p.p.m. on fat weight basis)		
	Astern	7 foot amidships	From the bowsprit
Oct. 1971	80	18	-- [1]
June 1972	170	12	7.6

[1] No collection.

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9.17 BIOTA OF CHESAPEAKE BAY

McErlean, Andrew J., Catherine Kerby, and Marvin L. Wass (editors)
Chesapeake Science 13, Supplement, 197 pp. (Dec. 1972)

The biota of Chesapeake Bay is being subjected to environmental stresses which eventually may cause major alterations of resident ecosystems. In order to prevent or control these modifications, changes in the biota must be detected before they reach an irreversible state.

The Congress of the United States directed the U.S. Army Corps of Engineers to make a complete investigation of water utilization and control of the Chesapeake Bay Basin. The staff of the Corps arranged for a study of the biota of the bay to be conducted by the personnel of a consortium of the following institutions: The Johns Hopkins University, University of Maryland, Virginia Institute of Marine Science, and Smithsonian Institution.

The results of the study were published in this special issue of Chesapeake Science and include the following major topics: (1) a summary of the current state of knowledge of many groups of organisms living in the bay; (2) current status of research and knowledge on four topics of concern--sediments, eutrophication, heavy metals, and pesticides; (3) a review and report on the value of various criteria for measuring biological effects of environmental changes in the bay; and (4) systems for handling the massive data which must be used in managing a complex ecosystem.

These reports provided the first comprehensive summary of biota of Chespeake Bay, the largest and most valuable estuarine system in the United States. SW

9.19

The total amount of PCB compounds in plankton samples from different localities in Stockholm Harbor ranged from 3.1 to 35 p.p.m. (on fat weight basis). There was a decrease in the levels of PCB in plankton in the peripheral parts of the archipelago.

The study demonstrated that samples of plankton collected in the wake of the boat are strongly contaminated with PCB from the bottom paint. It is possible, therefore, that the archipelago of Stockholm is polluted not only from sources on the shore, but also from boats. Furthermore, the PCB pollution of the Baltic may, to some extent, depend upon the traffic of boats.
[2 figures, 3 tables, 8 references] FTP

9.19 ZINC-65 UPTAKE BY A BACTERIUM ISOLATED FROM ALDER SLOUGH, COLUMBIA RIVER ESTUARY (0.5)

Tonjes, Stephen Dodd (Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98357j (Oct. 9, 1972)

9.14 (1.69) STUDIES ON THE NUTRITION OF MARINE FLATFISH. THE PROTEIN REQUIREMENT OF PLAICE (PLEURONECTES PLATESSA)

Cowey, C. B. (Institute of Marine Biochemistry, St. Fittick's Road, Aberdeen, AB1 3RA, Scotland), J. A. Pope, J. W. Adron, and A. Blair
British Journal of Nutrition 28, 447-456 (1972)

A high dietary protein requirement by several species of fish has been reported elsewhere. Dose-response is the criterion. For example, the chinook salmon dose-response curve for dietary protein levels off at a protein concentration between 40 and 55%, depending on temperature, and at 40% for channel catfish.

The dietary protein requirement of young plaice in water at 15° C. was examined by feeding six rations containing protein at equally spaced concentrations between 20 and 70% of the dry diet. The protein source was freeze dried cod muscle.

The results indicate that weight gain increased steadily up to a level of about 50% protein in the diet and subsequently fell. The authors suggest the possibility that very high dietary protein levels may depress growth rate. The estimated dietary protein requirement of plaice for optimum growth was found to be 52%, the same order as that reported for other carnivorous fish.

Net protein utilization and protein efficiency ratio were measured at each dietary protein level. The results indicated less efficient utilization of dietary protein by plaice than by rats.

The gross composition of the plaice in the experiment also varied with protein dietary level; the carcass protein content increased with dietary protein level. The plaice carcass in the experiment had greater lipid content than that of wild plaice, and the larger amounts probably reflected the levels of lipid in the diets.
[2 figures, 7 tables, 15 references] SW

9.19

as low as 1 to 2 p.p.b. (with LC_{50} value of 6.5 p.p.b.) and Aroclor 1254 was also toxic at 1 to 2 p.p.b. (with LC_{50} value of 15 p.p.b.). These levels are considerably below the published values of 0.3 to 1.5 p.p.b. sea water solubility of Aroclor 1254.

The results suggest that the toxic effects of organochlorine are more acute in situ at a community level than for single species laboratory cultures.
[1 figure, 18 references] FTP

9.19 PHOTOMETRIC METHODS FOR DETERMINING TOXICITY (BASED ON THE HEMOGLOBIN LEVEL AND THE OSMOTIC RESISTANCE OF ERYTHROCYTES IN FISH)

Luk'yanenko, V. I. (Tsentr. Nauchno-Inst. Oseotrovogo Rybn. Khoz., Astrakhan, U.S.S.R.)
Chemical Abstracts 77, No. 11, 70961c (Sept. 11, 1972)

9.19 REMOVAL OF HEAVY METALS FROM WATER AND BRINE USING SILICON ALLOYS

McKaveney, James P., William P. Fassinger, and David A. Stivers (Garrett Research and Development Co., Inc., La Verne, CA 91750)
Environmental Science & Technology 6, No. 13, 1109-1113 (Dec. 1972)

Methods for removal of heavy metals from waste waters and brine were examined. The heavy metals group consists principally of arsenic, cadmium, copper, lead, and zinc. Because of economics or other considerations ion exchange with resins, activated carbon, and solvent extraction were not considered. Metallic exchangers, however, were selected for study because of their broad activity, economy, and simplicity in removal of metallic impurities from water. The exchange is limited to the removal of metals below the exchanger metal in the electromotive series. These reactions require an additional treatment with alkali to separate the unwanted metal ions from solution as insoluble metal hydroxides. Elimination of this step would permit use of more active exchange metals such as calcium or magnesium; however, calcium is extremely reactive with water and magnesium corrodes over an extended period. To make these exchanger metals more resistant to aqueous attack, the use of alloys of these metals was considered.

Initial studies were performed to find alloy types and to determine their ability to remove the more common heavy metals. Silicon alloys of calcium and magnesium produced the best results with regard to broad coverage and replacement of heavy metals with elements common in natural waters (calcium and magnesium). Ferrosilicon was fairly selective in removing mercury without iron contamination.

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9.19 PERSISTENT PESTICIDES AND PCBs IN THE ENVIRONMENT

Anonymous
Nature 240, No. 5380, 319-320 (Dec. 8, 1972)

Organochlorine insecticides (for example, DDT and dieldrin) have been used in agriculture and in the control of disease vectors for more than 20 years. The polychlorinated biphenyls (PCBs) have been used in plastics, paints, and other industrial products for about the same length of time. These substances persist in the environment for a long period; furthermore, they are fat soluble which causes them to be stored in lipids and thus to be transferred from one organism to another. Three questions have arisen concerning the significance of the pesticides and PCBs in the environment.

The first question relates to their identification in the environment. Errors in identifying organochlorine insecticides were possible earlier; however, both the pesticides and PCBs can now be correctly identified, although there are still considerable difficulties in quantifying small amounts of PCBs in the field. The PCBs and organochlorine insecticides are unquestionably widely distributed in water, soils, and organisms throughout the world.

The second question is whether both types of substances are biologically active at the low levels that they are found in the field. Laboratory studies have shown that the substances can have measurable effects at dose rates considerably below those which are lethal, but whether these effects occur in the field and are important are not known.

The third question is: Do persistent organochlorine insecticides and PCBs significantly affect populations of organisms other than those in target areas or

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9.19 LIMITING FACTORS IN PHYTOPLANKTON ALGAE: THEIR MEANING AND MEASUREMENT

O'Brien, W. John (Dept. of Systematics and Ecology, University of Kansas, Lawrence, KS 66044)
Science 178, No. 4061, 616-617 (Nov. 10, 1972)

Understanding and controlling eutrophication requires knowledge of the factors limiting the growth of phytoplankton algae. There are two common responses of plants to changes in concentration of limiting factors: change in the final yield (type I response) or change in the growth rate (type II response). Type II response is typical of phytoplankton algae in nature, but in some laboratories experiments have failed to show growth rate changes. The author believes that one rate limiting factor, in these experiments, was in such low concentration that it obscured the effect which a change in concentration or intensity of other limiting factors could have had on growth rate. The intensity of light could have such an effect. At low intensities a change in concentration of nitrogen and phosphorus had no effect on the rate of growth; at medium light intensities the rate of growth was higher with increased concentration of nitrogen and phosphorus. Such a situation may be common in laboratory studies where it is difficult to supply natural light intensities, and it may account for much data that fit growth response patterns of type I rather than of type II.

Another source of difficulty in observing change in growth rate involves use of a batch culture technique. A large amount of water to be tested and incubated with a relatively small inoculum of a test organism rarely shows a type II growth

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9.19 CLINICAL SYMPTOMS OF MERCURY POISONING IN MAN

Bidstrup, P. Lesley (11 Sloane Terrace Mansions, Sloane Terrace, London SW1X 9DG, England)
Biochemical Journal 130, No. 2, 59P-61P (Nov. 1972)

Mercury vapor, inorganic compounds of mercury, and aryl series organic compounds of mercury such as phenylmercuric acetate produce symptoms that are different from those caused by short-chain alkylmercury compounds such as ethyl and methylmercury.

Mercuric chloride ($HgCl_2$), otherwise known as corrosive sublimate, is seldom found as a cause of acute, systemic poisoning in modern times. Exposure to high concentrations of mercury vapor causes lung irritation. Constant exposure to metallic mercury with absorption from inhalation of vapor and droplets, or through the skin results in nervousness, irritability, blushing, change of temperament, and tremor. These symptoms subside upon removal from exposure. Proteinuria is a rare nephrotic symptom. Normal mercury output in urine is less than 25 µg. per liter; it fluctuates from those exposed to mercury. Compounds such as phenylmercuric acetate have been used as fungicides and germicides in therapy and as fungicides in industry. Inorganic and phenylmercury compounds can be found in the following tissues of subjects after exposure: kidney, liver, spleen, muscle, and blood. They disappear quickly from all tissues except the kidney.

Ethyl and methyl derivatives of mercury are highly toxic, acting on the central nervous system and sensory peripheral nerves. In mild cases symptoms may be

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pattern. In this kind of experiment a diminished growth rate (caused by a low concentration of a limiting factor) appears only as the phytoplankton population approaches maximum yield. However, the change in growth rate is almost impossible to observe, because while the population is growing exponentially the nutrient concentration is decreasing exponentially. Only during the last days of the experiment does the population encounter a rapidly decreasing nutrient concentration; the rate of growth change is abrupt and difficult to detect.

Workers in the eutrophication field ought to recognize the basic differences in the two growth patterns and design experiments that will test for changes in growth rate (type II) rather than type I.

[2 figures, 20 references] SW

9.19 ZINC-65 AND DDT RESIDUES IN ALBACORE TUNA OFF OREGON IN 1969 (1.121)

Pearcy, William G., and Robert R. Claeys (Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98391r (Oct. 9, 1972)

9.19

few: impairment of memory, inability to concentrate, and numbness and tingling of lips and fingers with slight tremor. In advanced cases serious or total disability occurs: loss of muscle coordination, difficulty in articulating words, vision failure, and renal failure. Alkylmercury compounds are used to control fungus in agriculture. Microorganisms can convert inorganic forms of mercury to methylmercury. In waters where mercury occurs and fish feed, high concentrations of methyl mercury can be found in the fish. Ethyl and methylmercury compounds accumulate in all tissues, particularly the brain, and are excreted more slowly than are inorganic and aryl mercury compounds.

[19 references] SW

9.19 PCBs [CHLOROBIPHENYLS] IN FISH FROM THE MILWAUKEE REGION

Veith, Gilman D., and George Fred Lee (Water Chem. Program, Univ. Wisconsin, Madison, Wis.)
Chemical Abstracts 77, No. 15, 97455c (Oct. 9, 1972)

9.19

Brine and other aqueous solutions over pH range of 2 to 12 were treated. To minimize acid attack and to conserve the exchanger alloy, pH of 4.0 or more was acceptable. The metals that were successfully removed are silver, arsenic, gold, cadmium, copper, chromium, iron, mercury, lead, and zinc. Mercury was also removed from chlor-alkali brines.

[5 tables, 22 references] SW

9.19 ACTION OF A MERCURY PREPARATION ON CARP

Romashevskii, E. K. (Donskoi S.-Kh. Inst., Persianovka, U.S.S.R.)
Chemical Abstracts 77, No. 15, 97483k (Oct. 9, 1972)

9.19

those subjected to accidental or deliberate release of concentrates? In the field, factors interact and a population increase or decline may be caused by one factor in one place and by another factor in another place or at another time. Furthermore, a sublethal effect may be critical in one case but not in another case. Each case must be considered on its merits; various examples are described.

The author believes that the extent to which a country can limit the use of persistent organochlorine insecticides depends on local conditions. Their use will be required in tropical countries for some time, but their withdrawal, total or partial, in nations in the temperate zone appears to be a wise precaution to protect natural resources. The real argument about organochlorine insecticides, the author states, is not whether one should prefer men to peregrines (Recent studies in Britain have shown that these falcons have been affected by the acute toxicity of the organochlorine pesticides.), but whether men should take serious note of what happened to peregrines as a result of using substances which are both valuable and at the same time dangerous to a wide range of organisms. FTP

9.19 CONTAMINATION OF SHRIMP (LEANDER SERRATUS) BY CESIUM-137 IN FOOD

Lemee, J. C., J. Ancellin, A. Vilquin (Dep. Prot. Sanit., Commis. Energ. At., Cherbourg, France)
Chemical Abstracts 77, No. 17, 111013r (Oct. 23, 1972)

9.19 ORGANOCHLORINE LEVELS IN ATLANTIC SEABIRDS

Bogan, J. A. (University of Glasgow, Dept. of Veterinary Pharmacology, Veterinary Hospital, Bearsden, Glasgow, G61 1QH, Scotland), and W. R. P. Bourne (The Seabird Group, Zoology Dept., Tillydrone Ave., Aberdeen AB9 2TN, Scotland)
Nature 240, No. 5380, 358 (Dec. 8, 1972)

The authors are reporting elsewhere [Mar. Pollut. Bull. (in press)] detailed data on the organochlorine levels in Atlantic seabirds occurring between Scotland and the Arctic; the present paper reports in a general way the results obtained. The Atlantic seabirds contained mainly PCBs and pp'-DDE, with the PCBs occurring in greater concentration in every bird. (This is in marked contrast to the North Pacific area where other workers found that the DDE levels were normally higher.) In the North Atlantic seabirds the ratio of PCB to DDE was between 2::1 and 10::1 in all species except the kittiwake (Rissa tridactyla) where the ratio was higher--in some kittiwakes as high as 60::1. Some data reported are as follows: Total organochlorine content of the muscle and liver of auks and shearwaters was between 0.1 and 1.0 p.p.m.; of kittiwake, fulmar, and British storm-petrel was between 1 and 10; and of large gulls and skuas was about 10. The stomach oil of a fulmar contained 1.3 p.p.m. of PCBs, the liver contained 1.5 p.p.m., the muscle 2.3 p.p.m, and the fat 42 p.p.m.

There were no substantial differences in the organochlorine content of birds from the north of Scotland, the Faroes, and the Barents Sea. The highest levels were found in glaucous gulls, Larus hyperboreus, breeding above the seabird colonies on the cliffs of Bear Island; normal birds had an average content of 24 p.p.m. of PCBs and 17 p.p.m. of DDE in the liver, and one bird had 535 p.p.m. of PCB and

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9.19 THE BIOLOGICAL PROPERTIES AND DISTRIBUTION OF MERCURY

Clarkson, T. W. (Medical School, University of Rochester, Rochester, NY 14620)
Biochemical Journal 130, No. 2, 61P-63P (Nov. 1972)

Mercury-containing compounds have high affinity for the thiol group (-SH). Since most proteins contain thiol groups that are metal reactive, and because thiol groups are important to most protein functions, mercury can disturb most functions involving enzymes.

Studies of the processes of mercury absorption, distribution, and excretion were conducted to determine the mechanism of transport and distribution. Results indicated that all mercury vapor in the lung was completely absorbed; in addition, after ingestion of methylmercury and phenylmercury compounds, gastrointestinal absorption was found to be in the range of 80 to 100%. Under similar conditions 15% or less of inorganic mercury, such as $HgCl_2$, was absorbed. Phenylmercuric acetate and $HgCl_2$ produce similar toxic effects in the kidney. Because of the difference in amounts absorbed, much lower dietary doses of the phenylmercury compound than $HgCl_2$ can cause damage. The much greater threat of mercury vapor to the central nervous system was shown by its complete absorption in the lungs; mercury content of brain after exposure to vapor was substantially higher than after exposure to inorganic mercury compounds.

The practically complete absorption of the short chain alkylmercury compounds (as methylmercury) from food, and their ability to cross cell membranes (as blood-brain and placental barriers) indicates the hazard to the central nervous system of animals from the fetal stage and on. The high absorption of methylmercury and

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9.19 (0.322) THE BIOLOGICAL ALKYLATION OF MERCURY

Landner, Lars (Swedish Water and Air Pollution Research Laboratory, Box 5607, S-114 86 Stockholm, Sweden)
Biochemical Journal 130, No. 2, 67P-69P (Nov. 1972)

Since much of mercury pollutants was found to be in the form of alkylmercury (such as methylmercury), studies were performed to determine the biochemical pathways of alkylation. Earlier work showed that a Clostridium species was capable of producing methylmercury on a substrate containing mercuric chloride ($HgCl_2$), cysteine, and vitamin B_{12}. No production of methylmercury occurred from medium containing mercuric sulfide (HgS). Anaerobic conditions in natural waters almost always indicate the presence of hydrogen sulfide (H_2S) which reacts with and binds available mercury as mercuric sulfide (HgS). Additional studies showed that mercury bound as HgS is very much less available for methylation than the mercuric ion Hg^{2+}. Furthermore, no methylmercury was found in mud and soil under strict anaerobic conditions.

In contrast, large amounts of methylmercury have been found in upper layers of lake sediments and in dredged, air-dried, mercury-containing sediments. The author concluded that the most important biomethylation of mercury is performed by aerobic organisms.

The pathways of methylation in aerobic microorganisms were found not to be by direct transmethylation. Rather, methylation of mercury appeared to be a detoxification reaction by mercuric ion resistant bacteria. Further findings

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9.19 (1.89) MIREX RESIDUES IN WILD POPULATIONS OF THE EDIBLE RED CRAWFISH (PROCAMBARUS CLARKI)

Markin, George P., Joseph H. Ford, and Joseph C. Hawthorne (U.S. Dept. of Agriculture, Plant Protection and Quarantine Programs, Gulfport, MI 39501)
Bulletin of Environmental Contamination and Toxicology 8, No. 6, 369-374 (Dec. 1972)

The rearing of the red crawfish in rice fields and ponds or trapping them in canals, bayous, and swamps is important industry in Louisiana. Crawfish are sensitive to many chlorinated hydrocarbon insecticides including DDT, dieldrin, and endrin; they are moderately sensitive to aldrin. Mirex is related to other chlorinated hydrocarbon insecticides, but it is totally chlorinated.

Mirex use is widespread in controlling the imported fire ant, an agricultural and human pest in Louisiana. Mirex bait is retailed to homeowners in bags containing 0.15% actual toxicant. Farmers use a 0.3% Mirex formulation.

Studies of Mirex toxicity on juvenile forms of two related crawfish indicated they were extremely susceptible and were capable of concentrating Mirex 27,210-fold from environmental water containing the insecticide.

The continued use of Mirex appeared to be a threat to the crawfish industry. To evaluate the problem, studies were undertaken to determine if Mirex residues in crawfish from Mirex-treated areas approach the levels found under laboratory conditions to be toxic. Crawfish were collected from ponds, canals, bayous, swamps, and other areas which had a history of Mirex bait use in pastures adjacent to the waters. The crawfish were washed, homogenized, and extracted with a hexane and isopropanol mixture. The treated extract was cleaned up in a florisil column

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indicated that detoxification involves one or more steps in the synthesis of methionine. Homocysteine is the last precursor in the stepwise synthesis of methionine; homocysteine is transformed, via methylation, into methionine. In the presence of mercury, the methyl group is not transferred to the homocysteine molecule but is transferred to the mercury atom. The author suggests that methylation of mercury may be regarded as an incorrect synthesis of methionine.

In regions of high mercury pollution the presence of mercury resistant bacteria has ecological consequences; the ability of these organisms to methylate mercury will increase the mobility of mercury in the sediment. This increase will cause higher concentrations of mercury to appear in water-living organisms at the end of the food chain.
[15 references] SW

9.19 CONVERSION OF SOLID WASTE TO LIQUID FUEL

Weiss, Alvin H. (Dep. Chem. Eng., Worcester Polytech. Inst., Worcester, Mass.)
Chemical Abstracts 77, No. 26, 166596d (Dec. 25, 1972)

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67 p.p.m. of DDE in the fat. The authors believe that it seems a matter for concern that such high levels of organochlorine compounds can now be found in the Arctic over 250 miles north of the mainland and in a species that never migrates far south, in an area where the surface sea water probably does not even originate in Europe, but in the western North Atlantic.
[8 references] FTP

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and concentrated by evaporation. Gas chromatography was used for analysis and identification of residues.

Field studies showed no massive population declines of crawfish. Most of the crawfish tested showed no detectable amounts of Mirex. Residues that were obtained were below levels capable of causing mortality (1 to 8 p.p.b.). The authors concluded that the use of Mirex in south-central Louisiana is not a threat to the crawfish industry.
[1 table, 10 references]

9.19 EFFLUENT-FREE CHLORINE DIOXIDE GENERATING PLANT
FOR PULP BLEACHING

Ishi, Genzo, Tadashi Shimomura (Japan Carlit Co., Ltd., Tokyo, Japan)
Chemical Abstracts 77, No. 26, 166351e (Dec. 25, 1972)

9.19 IMPACT ON ORGANOCHLORINE CONTAMINANTS
ON PHYSIOLOGICAL FUNCTIONS IN FISH

Grant, Blake F., and Richard A. Schoettger (Fish-Pestic. Res. Lab., Columbia, Mo.)
Chemical Abstracts 77, No. 17, 110285u (Oct. 23, 1972)

9.19 EFFECTS OF HYDROGEN SULFIDE ON FISH EGGS AND FRY

Smith, L. L., and D. M. Oseid (Dep. Entomol. Fish. Wildl., Univ. Minnesota, Minneapolis, Minn.)
Chemical Abstracts 77, No. 17, 110198t (Oct. 23, 1972)

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phenylmercury compounds from foods may be due to the diffusibility and lipid solubility of the mercury atom. The chloride complexes of mercury, resulting from digestion of protein bound methylmercury, are also lipid soluble.

Metallothionein is a protein that may be important in protecting kidney tissue from damage by inorganic mercury compounds. This protein, which is high in thiol content, is present in the kidney in amounts sufficient to bind the amount of mercury associated with the onset of kidney damage. When the binding capacity of metallothionein is exceeded, damage to the kidney begins.

The formation of diffusible, mercury complexes with thiol compounds in the liver is an important process in the distribution of mercury--through the blood stream--to organs and tissues of the body.
[13 references] SW

9.2 FISHERIES COOPERATIVES: THEIR FORMATION AND OPERATION

Napoli, James J. (University of Rhode Island, Marine Advisory Service, Narragansett, RI 02882)
Marine Memorandum 30, Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882 (1972), 18 pp. Price not given.

This article is a report of the proceedings of the Workshop on Fisheries Cooperatives held in Galilee, R.I., on June 6-7, 1972. The workshop was sponsored by the University of Rhode Island Marine Advisory Service. The subject areas covered are (1) the definition of a cooperative, (2) how to start a cooperative, (3) the problems of cooperatives, and (4) uniting cooperatives into regional organizations. The appendix contains information on the Farm Credit System (by Bruce Morehead) and a list of workshop participants. A cooperative provides an alternate system for carrying out business when the regular market system does not work. There are two general types of cooperatives--producer cooperatives and consumer cooperatives. The producer cooperatives, which better serve the fishermen, can perform the functions of marketing, supply, production, and bargaining. The key to the success of any cooperative is a competent cooperative manager. [4 references] FTP

9.3 REPORT OF THE WORKING GROUP ON INTRODUCTION OF NON-INDIGENOUS MARINE ORGANISMS

Anonymous
Cooperative Research Reports No. 32, 59 pp. (Nov. 1972) (International Council for the Exploration of the Sea, Charlottenlund Slot, DK-2920, Charlottenlund, Denmark)

This report covers the advantages and complications of introducing and domesticating animals not native to an area. The benefits derived from these introductions are well known, but the associated pests and diseases that accompanied the new comers have caused many intractable problems.

Careful consideration needs to be given to proposals for introduction of new animals, and guidelines should be developed to aid reaching decisions. To assist in this task the International Council for the Exploration of the Sea setup a working party to investigate the procedures necessary to be followed in the introduction of nonindigenous organisms.

The recommendation of the working party is that national legislation should be enacted which prohibits the importation of marine organisms except under license. The license procedure would exercise all activities that would safeguard the existing ecosystems against unwise introductions.

A 12-page bibliography on the subject of introduced organisms is given. In addition, a sample questionnaire is provided for possible development into a record-keeping system for use in international control of introductions. SW

9.2 A PENETRATION OF THE TECHNOLOGICAL FORECASTING JUNGLE

Lanford, H. W. (Dept. of Management, School of Business and Administration, Wright State University, Dayton, OH 45431)
Technological Forecasting and Social Change 4, No. 2, 207-225 (1972)

In this article, the author discusses some of the difficulties facing technological forecasters today. He defines the various methodologies. In spite of the difficulties involved in technological forecasting, it is increasing in use as a valuable tool for planners. Nevertheless, technological forecasting has a long way to go to achieve its full capacity as a decision aid to planners. In a recent survey, other workers found that technological forecasting was a relatively important input to formal planning in research in only 50% of the companies reporting (in engineering 28%, in marketing 15%, and in manufacturing 25% of the companies reporting). Technological forecasting has the capability to assist managers, decision makers, and planners to a much greater degree. [5 figures, 21 references] FTP

9.3 THE SPECIES APPROACH: A SOLUTION TO LAW OF THE SEA

Weddig, Lee J. (National Fisheries Institute, Washington, D.C.)
Fishing Gazette 90, No. 1, 15-17, 32 (Jan. 1973)

The jurisdiction that governments seek to maintain over the ocean are limited to geographical boundaries, although the fish stocks they wish to control may occupy the areas so controlled only seasonally. Developing nations are in favor of extended jurisdiction (200-mile limit) over the adjacent seas while nations with distant water fishing fleets oppose extended jurisdiction. Similar opposing views exist among segments of the U.S. fishing industry. The New England segment would be improved, members believe, by the imposition of a 200-mile limit to protect their inshore fishery from damage by foreign trawlers. Southern California tuna fishermen, on the other hand, oppose such a limit, believing that if it were imposed everywhere their distant water fishing prospects would be damaged.

The essential feature of the species approach is the necessary regulation required to give a species the capability of perpetuating itself. In addition, the species approach recognizes economic rights and management rights of coastal nations to harvest stocks adjacent to their coasts. If the fishermen of these nations underharvest the stocks, provisions would be made for other nation's fishermen to complete the harvestable quota. The nation in which anadromous fish spawn would manage them and have preferential harvest rights beyond the territorial sea to the limits of their migratory range. When the fish are harvestable in the territorial waters of other nations, all the nations involved would be required to share the catch consistent with conservation and the rights of each nation. For

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9.2 AN EVALUATION OF THE FORECASTING OF INFORMATION PROCESSING TECHNOLOGY AND APPLICATIONS

Grabbe, Eugene M. (State Center for Science Policy and Technology Assessment, Dept. of Planning and Economic Development, Honolulu, Hawaii), and Donald L. Pyke (Academic Planning, University of Southern California)
Technological Forecasting and Social Change 4, No. 2, 143-150 (1972)

Comprehensive technological forecasting is a tool used to provide answers to four questions: (1) What trends are operative in the technology in question? (2) What are the alternatives, if any? (3) What is the nature and extent of the effort involved to reach each alternative?, and (4) How do the alternatives and their related efforts compare? This article describes the approaches used in modern technological forecasting and discusses several forecasts that concern information processing. The events that were anticipated during the years 1968 to 1972 are evaluated against the occurrence of the events, and forecasts for the future are compared. Also, the future role of the computer in technological forecasting is discussed.

The results suggest that information processing technology and applications are advancing more rapidly than predicted by the forecasts. Various long-range forecasts on information processing are in general agreement. The computer will increase in importance in future forecasts as a subject and a tool for processing and forecasting data.
[5 tables, 11 references] FTP

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fish of ocean origin that are migratory, such as tuna, the management of such species would be the responsibility of multinational control.

The U.S. Government submitted draft articles during the second preparatory session of the Law of the Sea Conference in which the species approach was recognized. At the third preparatory session in March 1972, a representative of the United States indicated a willingness to accept the concepts of the species approach. This position was presented as a draft article in the fourth preparatory session in August 1972.

The author suggests that the species approach will protect the interests of the U.S. industry. Only a small number of nations have supported the species approach. However, there are two more preparatory sessions scheduled prior to the opening of the Law of the Sea Conference in 1974. The U.S. position on species approach may bring the extreme contrary views of the developing nations and the distant water fishing nations to a compromise position. SW

9.2 FISHERIES STATISTICS OF THE PHILIPPINES 1970
(1.0157)

Prepared by the Economics and Statistics Section, Fisheries Information Division of the Philippine Fisheries Commission
Philippine Fisheries Commission, Fisheries Information Division, Dept. of Agriculture and Natural Resources, Manila, Philippines (n.d.), 118 pp.

These fishery data are for the 5-year period 1966 to 1970. The data are presented in the form of 34 tables and three appendices.

The first major subjects tabulate quantity and value of fish produced between 1951 and 1970; fish production for the 5-year period; the nutritional requirements and deficits of fish production; and fish consumption.

The second major subject tabulates aspects of commercial fishing vessels: numbers (powered and unpowered); production by kind of vessel, gear used, kind of fish, fishing ground, and time of year.

The third major subject tabulated is fishponds in operation and available for development.

Foreign trade is tabulated under exports, by kind, quantity, value, and destination.

Gathered fishery products are the last subjects tabulated. Kind, quantity, and value are shown. Fishery products in domestic trade are also listed.

The appendices list the fishery regions, fishing grounds frequented by fishing vessels, and forms used in collecting information on the industry.
[34 tables, 3 appendices] SW

9.3 THE 1973 LAW OF THE SEA CONFERENCE: SIGNIFICANT ISSUES

Lumb, R. D. (University of Queensland, Australia)
University of Queensland Law Journal 7, No. 2, 256-279 (Dec. 1971)

Some of the articles of the existing Conventions on the Law of the Sea that are in need of revision are article 1 of the Convention on the Territorial Sea and Contiguous Zone (does not specify the breadth of the territorial sea), articles 4-7 concerning the demarcation of internal waters, articles 14-17 dealing with the right of innocent passage, and article 24 concerning the contiguous zone. Some revision of article 1 (definition of continental shelf) will be necessary if the international regime makes provision for an area of international jurisdiction incompatible with this definition. Also, certain articles of the Convention on Fishing and Conservation of the Living Resources of the High Seas will have to be reexamined to determine whether they provide adequate protection to the interests of coastal states in conserving fishery resources in adjacent waters. The present paper contains a discussion of each these matters.
[134 footnotes] FTP

9.3 PUBLIC RIGHTS AND COASTAL ZONE MANAGEMENT

Schoenbaum, Thomas J. (School of Law, University of North Carolina)
North Carolina Law Review 51, No. 1, 1-41 (Nov. 1972) Sea Grant Publication UNC-SG-72-13 (Reprint)

Because of the pressure of various, and often conflicting, use patterns, legal and institutional innovations are needed to protect our estuarine and coastal resources. In this article the author examines the principal legal aspects of coastal zone resource management. He reviews the present law relating to public rights in the lands and waters of the coastal zone and existing patterns of legislation for coastal resource presentation. Then, he offers suggestions for the creation of a coastal zone management agency and the development of a plan for managing coastal resources. The discussion is centered on the law of one particular jurisdiction, the State of North Carolina, but the principles developed may be applied by analogy to other coastal states.

Land and water use planning for the purpose of protecting resources, the author indicates, is a new departure for U.S. law and presents new challenges. The unique character of the coastal zones of this country, make them an appropriate area to begin the construction of a management program. New coastal zone legislation should consider the substantial rights of the public under traditional legal principles; such rights have been poorly enforced in the past. A coastal zone agency should be created to manage the coastal area so as not to exceed the environmental limits of development; it must not be constructed according to the tradiational model of the specialized, regulatory administrative agency. The agency should have planning and regulatory functions, with broad powers in many different areas.

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1.0114 (9.6)(9.12) GUIDE TO THE COASTAL MARINE FISHES OF CALIFORNIA

Miller, Daniel J., and Robert N. Lea
Fish Bulletin 157, 235 pp. (1972) (Dept. of Fish and Game, State of California)
Obtained from: Office of Procurement, Documents Section, P.O. Box 20191, Sacramento, CA 95820.

This guide contains comprehensive information on identification of 554 shallow marine species within California waters. All but three have been recorded as occurring in an area between the borders of Mexico and Oregon and offshore to at least 50 miles. Keys are shown for all the larger families with an outline illustration containing diagnostic features. All but eight species are shown in illustrations. An illustrated glossary is included which facilitates use of identification keys and species description.

Original data include a ventral sensory pore pattern key for the skates, 170 geographic range limit extensions, and several depth range and maximum size records. The family keys, where applicable, incorporate recent changes in taxonomy and terminology. SW

9.3 ISSUES RAISED BY THE ATTACHMENT OF THE SULEYMAN STALSKIY: SOVEREIGN IMMUNITY OF SOCIALIST FISHING VESSELS AND LIABILITY FOR DAMAGE TO FIXED FISHING GEAR BY VESSELS FISHING MOBILE GEAR

Windley, David W. (International Activities Staff, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Washington, D.C.), and Carmen J. Blondin (Office of the Chief Counsel, U.S. Coast Guard, Washington, D.C.)
Journal of Maritime Law and Commerce 4, No. 1, 141-157 (Oct. 1972)

A lobster fishing company in Massachusetts lost many of its lobster fishing pots in the offshore fishery resulting from trawling activities of foreign fishing vessels. After failing to obtain relief through diplomatic channels the company brought suit against the U.S.S.R. on June 10, 1971 in the U.S. District Court for the Northern District of California in San Francisco, Calif. The complaint cited the owners of 23 trawlers and other fishing vessels operating in the same fleets known as U.S.S.R. The complaint also indicated that the defendent was not to be found within the jurisdiction of the court, and sought attachment of the Soviet Union freighter Suleyman Stalskiy (then at dock in San Francisco). Eventually a negotiated settlement was arranged. Thus, the decision on the merits of the case was never reached. The authors believe that the outcome of the case could have presented several interesting facets because of the various legal issues involved, namely, negligence, sovereign immunity, liability for damage to fixed gear, status of Socialist "entities" as private parties. The present article is a review of two of the most salient aspects of the case; (1) the sovereign immunity of Soviet Union fishing vessels and (2) liability for damage to fixed gear by vessels fishing mobile gear on the high seas. [78 footnotes] FTP

1.8 (9.6) KINGDOM OF THE SEASHELL

Abbott, R. Tucker (Delaware Museum of Natural History)
Published by Crown Publishers, Inc., New York (1972), 256 pp. Price not given.

This book defines the mollusc and its six classes--Gastropoda, the best known, consisting of the conches, welks, and snails; Bivalvia, the most important economically, contains the clams, oysters, and scallops; Cephelopoda, with the suprising grouping of squids, octupuses, and nautiluses--and three minor classes--Scaphoda (looks like a miniature elephant tusk); Amphineura (snaillike, also called chitons); and Gastroverms, a primitive, segmented, limpetlike shell.

The book contains chapters on the biology of molluscs: where and how they live, geographic locations, habits, and evolution. There are also interesting chapters on seashells: collectors and collections, response of man through the ages, commercial uses, and applications in art, jewelry, and science. Additionally, a guide to seashell literature and many full color illustrations are included. SW

9.3 GENERAL ASSEMBLY SETS SCHEDULE FOR CONFERENCE ON LAW OF THE SEA

Stevenson, John R. (U.S. Department of State, Washington, D.C.)
Department of State Bulletin 68, No. 1753, 113-116 (Jan. 29, 1973)

This article contains the statements by John R. Stevenson, Legal Adviser of the Department of State and U.S. Representative to the U.N. Seabed Committee, made in Committee I (Political and Security) of the U.N. General Assembly on November 28 and December 7, together with the text of a resolution adopted by Committee I on December 7 and by the Assembly on December 18.

In the resolution, the General Assembly requests the Committee on Peaceful Uses of the Sea-Bed and the Ocean Floor beyond the Limits of National Jurisdiction to hold two further sessions in 1973, one of five weeks at New York, beginning in early March, and the other of eight weeks at Geneva, beginning in early July, with a view to completing its preparatory work, and to submit a report with recommendations to the General Assembly at its 28th session. It requests the General Assembly to convene the first session of the Third United Nations Conference on the Law of the Sea at New York for a period of about two weeks in November/December 1973, for the purpose of dealing with organizational matters (election of officers, adoption of the agenda and rules of procedure of the Conference, establishment of subsidiary organs).

[It] decides to convene the second session of the Conference, for the purpose of dealing with substantive work, at Santiago, Chile, in April/May 1974, for a period of eight weeks, and such subsequent sessions, if necessary, as may be decided by the Conference and approved by the General Assembly, ...

[2 footnotes] Partly modified; partly reprinted

9.19 (9.6) A GUIDE TO MARINE POLLUTION

Goldberg, Edward D. (Scripps Institution of Oceanology, La Jolla, Calif.) (compiler)
Published by Gordon and Breach Science Publishers, Inc., 440 Park Ave., S. New York, NY 10016 (Copyright 1972 by the FAO), 168 pp. Price not given.

This book is based on reports made at the Seminar on Methods of Detection, Measurement and Monitoring of Pollutants in the Marine Environment, organized by the Food and Agricultural Organization of the United Nations, and held in Rome, Italy, December 4-10, 1970.

The chapters are as follows. "Halogenated Hydrocarbons." This chapter is mainly concerned with methods of analysis. "Petroleum." This pollutant and the extent of its worldwide distribution are defined in water, sediments, and organisms. "Inorganic Chemicals." The chief subject of this chapter is metals in sea water and their source. "Organic Chemicals." These pollutants, naturally occurring and man added, are defined in detail.

"Nutrient Chemicals." This chapter contains information on compounds containing nitrogen and phosphorus, such as ammonia, nitrates, and phosphates. They promote eutrophication. "Suspended Solids." This chapter contains a description of sewage pollution. "Radioactivity." This chapter covers the extent of current pollution and gives a prediction of the future burden.

"Test Organisms." Bioassay for detection and evaluation of pollution is described. "Design of a World Monitoring System." The concept of a single world environment with the need to monitor its condition is described in this chapter. Each chapter also contains analytical methods and references. SW

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The appendix is a copy of a bill entitled "A Bill To Be Entitled an Act Relating to Management of the Coastal Zone of North Carolina."

[206 footnotes, 1 appendix] FTP

9.6 MONTEREY BAY BIBLIOGRAPHY. SUPPLEMENT NUMBER ONE

Baron, Doris (compiler) (Moss Landing Laboratories, P.O. Box 223, Moss Landing, CA 95039)
Technical Publication 72-8, Moss Landing Marine Laboratories of the California State University at Fresno, Hayward, Sacramento, San Francisco, and San Jose, California (1972), 92 pp.

The main geographical area covered by the bibliography is the central California coast from Morro Bay to Tomales Bay.

The bibliography is partial and provisional. It covers geology, physical geography, and oceanography; additional subjects include meteorology, botany, and zoology. Other subjects include fisheries and fish culture. Scientific and general papers, books, and reports are listed, including miscellaneous publications. SW

9.6 NEW BOOKS

Gerecht, J. F. (reviewer)
Marine Chemistry, vol. 1
Martin, Dean F.
Published by Marcel Dekker, Inc., New York (1972), 389 pp. Price $9.75.
Journal of the American Oil Chemists' Society 50, No. 1, 7A, 13A (Jan. 1973).

This 1972 edition is a revision of the 280-page volume published in 1968. The book is devoted almost exclusively to analytical techniques used in marine chemistry. The book contains 35 chapters. It is divided into five sections as follows: I. Basic Contents and Methods (101 pp.); II. Analysis of Selected Micronutrients and Related Compounds (112 pp.); III. Other Spectroscopic Techniques (43 pp.); IV. Analysis of Polluted Waters (82 pp.); and V. Analysis of Sediments and Selected Organic Matter (34 pp.). FTP

7.0 (9.6) MANUAL OF ANALYTICAL TOXICOLOGY

Sunshine, I. (editor)
Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, OH 44128 (1971), 393 pp. Price $15.00.
B. L. Oser (Food and Drug Research Laboratories, Inc., Maspeth, NY 11378) (reviewer)
Food Technology 27, No. 2, 90 (Feb. 1973)

This book is a collection of concise descriptions of tests for the detection and determination in biological fluids and tissues of about 75 chemicals (drugs, pesticides, and other organic and inorganic toxicants commonly encountered in cases of clinical poisoning). FTP

7.45 AUTOMATIC DETERMINATION OF NITRITE NITROGEN AND NITRATE NITROGEN IN WATER AND SEWAGE [AUTOMATYCZNE OZNACZANIE AZOTU AZOTYNOWEGI I AZOTANOWEGO W WODACH I ŚCIEKACH]

Wudzińska, I., and A. Ponikowska
Gaz, Woda i Technika Sanitarna. No. 6, 207-211 (1971) (In Polish)
Polish Technical and Economics Abstracts NR1(85), 78 (1972) [Published by Centrum Informacji Naukowej Technicznej i Ekonomicznej, Warszawa, Al. Niepodległości 186, Poland]

This article is a discussion of the conditions of analysis for nitrite and nitrate nitrogen in samples of surface water as established by the Water Protection Establishment of the Institute of Water Control and Exploitation. The method is suitable for the analysis of undiluted samples containing nitrate nitrogen in the amount up to 5 mg./l. (thus levels encountered in surface waters can be determined). [8 figures, 3 tables] FTP

9.6 RHODE ISLAND MARINE BIBLIOGRAPHY

Anonymous
University of Rhode Island Marine Technical Report Number 3, 192 pp. (n.d.), Marine Advisory Service, Narragansett Bay Campus, Narragansett, RI 02882. Price $5.00.

The geographic areas covered by the bibliography are the tidal waters of Rhode Island, the outer limits being defined by a line from the Connecticut border through Fishers Island and Plum Island to Orient Point, then to Gardiners Island, Montauk Point, Block Island, Nomans Land, Gay Head, Cuttyhunk Island, and to the Massachusetts border.

The subjects covered include marine-related fields in biology, physics, chemistry, recreation, industry, and fisheries.

The types of publications listed include publicity, books, newspaper articles, films, journal articles, reports, studies, and letters. SW

9.7 (9.1) THE ENVIRONMENT FILM REVIEW. A CRITICAL GUIDE TO ECOLOGY FILMS

Anonymous
Environment Information Center Inc., 124 East 39th St., New York, NY 10016 (1972), 156 pp. Price $20.00.
G. N. Anderson (reviewer)
Food Technology 27, No. 2, 90 (Feb. 1973)

This review contains indexes and critiques of 627 environmental films. The films cover 21 categories: air pollution, chemical and biological contamination, energy, environmental education, environmental design and urban ecology, food and drugs, general, international, land use and misuse, noise pollution, nonrenewable resources, ocean and estuaries, population planning and control, radiological contamination, renewable resources-terrestrial, renewable resources-water, solid waste, transportation, water pollution, weather modification and geophysical change, and wildlife.

Ths list is intended to provide film users with a discriminating reference for selection of films according to subject covered, treatment, and ecological objectivity. FTP

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MARINE FISHERIES ABSTRACTS

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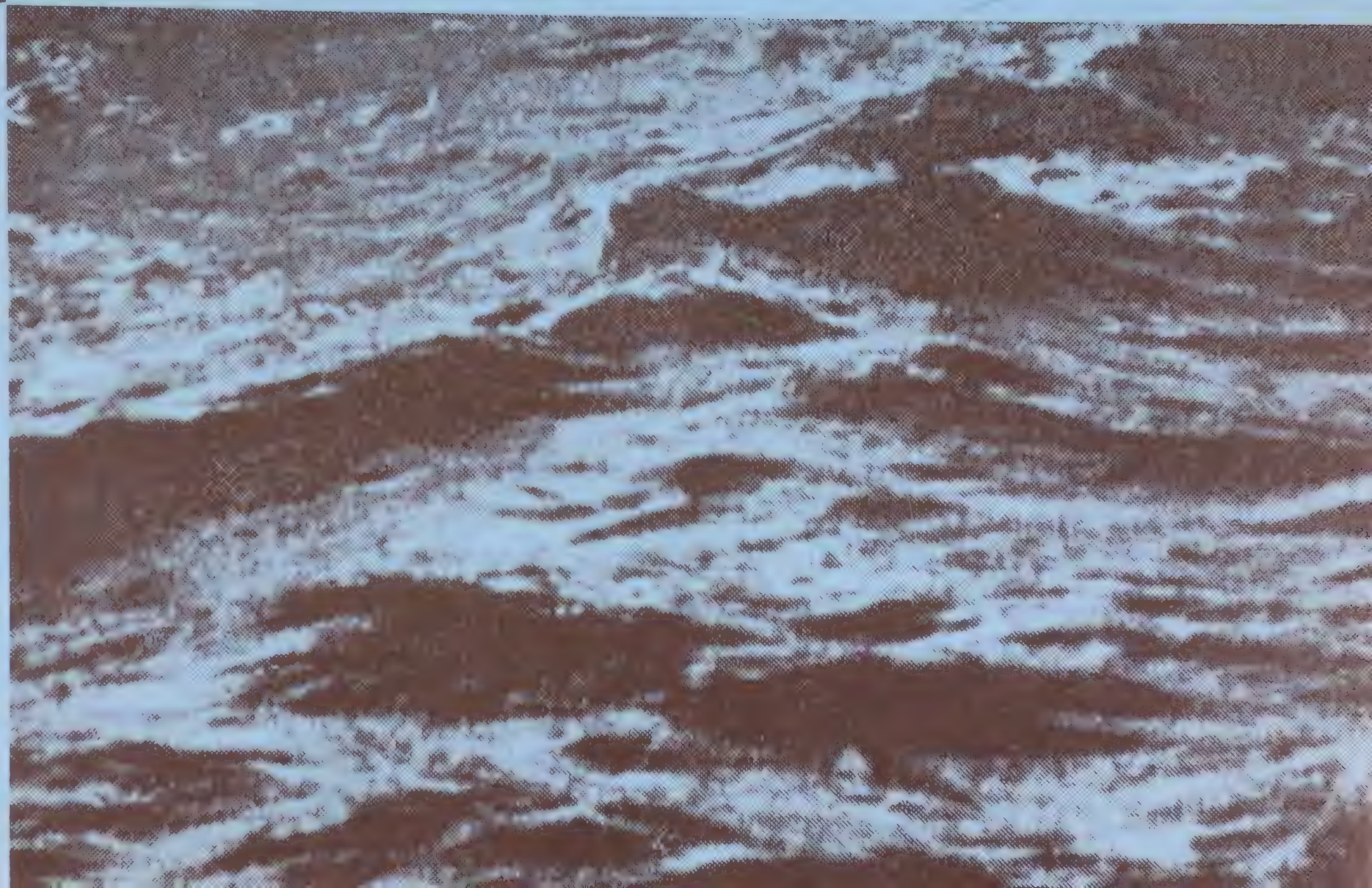

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

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0.35 CHOLESTEROL-CEREBROSIDE INTERACTION: THE ROLE OF α-HYDROXY FATTY ACIDS

Mickel, Hubert S., and Penelope L. Hill (Children's Hospital Medical Center, 300 Longwood Ave., Boston, MA 02115)
Lipids 7, No. 11, 733-737 (Nov. 1972)

The researchers examined the esterification of cholesterol by the plasma phosphatidyl choline-cholesterol acyltransferase reaction using two methods, radioisotopic and colorimetric, in the presence of cerebroside, ceramide, or methyl esters of lignoceric or α-hydroxy lignoceric acid. They demonstrated an interaction between free cholesterol and cerebroside or ceramide containing α-hydroxy fatty acids. The nature of the interaction was not elucidated. Cholesterol and cerebroside are components of the myelin sheath. It is possible that the interaction between cholesterol and α-hydroxy fatty acid cerebroside may result in greater cohesiveness of the myelin sheath.
[2 figures, 4 tables, 13 references] FTP

0.36 ASCORBIC ACID AND FAT CONTENT IN THE RED AND WHITE MUSCLES OF CARP, CATLA CATLA

Krishnamoorthy, R. V., and T. Narasimhan (Dept. of Zoology, Bangalore University, Bangalore 1, India)
Comparative Biochemistry and Physiology 43, No. 4B, 991-997 (Dec. 15, 1972)

In comparisons of red muscle to white muscle other reports indicated that red muscle has a higher myoglobin content, characteristic sarcoplasmic proteins, higher succinic dehydrogenase and respiratory enzymes, greater fatty acid oxidation and lecithinase activity, greater oxygen consumption, less water, and more glycogen and lipids. The reports also correlated the metabolic and structural differences to the functional differences: the red muscle is the sole source of motive power of the fish for swimming at slow and cruising speeds. Since ascorbic acid is a major influence in oxidative metabolism, enzyme systems, and other physiological activities, tests were performed to determine the ascorbic acid content, degradation products of ascorbic acid, and fat content of red and white lateral muscles of the carp.

The results indicated that there is three times more fat and 2% less water in red muscle, and the fat is more saturated than that in white muscle. White muscle contained 2.5 times more ascorbic acid than red muscle. White muscle contained 2.5 times more of the metabolite hydroascorbic acid (ASA); red muscle contained 13 times more dehydroascorbic acid (DHA) and 4 times more diketogulonic acid (DKA). These two acids are stepwise products of hydroascorbic acid

(over)

0.35 (9.13) VARIATIONS IN SERUM CONSTITUENTS OF THE BLUE CRAB, CALLINECTES SAPIDUS: CHLORIDE AND OSMOTIC CONCENTRATIONS

Lynch, M. P., K. L. Webb, and W. A. Van Engel (Depts. of Environmental Physiology and Crustaceology, Virginia Institute of Marine Science; and School of Marine Science, College of William and Mary, Gloucester Point, VA 23062)
Comparative Biochemistry and Physiology 44, No. 3A, 719-734 (Mar. 1, 1973)

The densities of the populations of blue crab often fluctuate from year to year, and the reasons for these fluctuations are not fully known. Previously, it was suggested that cold weather and low salinity (due to high river discharge) might be responsible, but the evidence was not conclusive. Blue crabs in the waters of Virginia are found in salinities from about 30-32 ‰ to fresh water. It was suggested that use of the proper chemical or physiological indices might be useful for predicting future abundance of blue crab. Variations in serum chloride and serum osmotic levels in mature, hard blue crabs were examined under the various environmental conditions of salinity and temperature found in Virginia waters.

Serum chloride and serum osmotic concentration in the blue crab vary seasonally, with the highest levels occurring during the winter and the lowest levels in the summer. This seasonal variation was related primarily to changes in temperature. During March through October (temperature of 21°-29° C. and salinity of <1-31 ‰), the serum chloride is maintained hyperionic to the medium below salinities of about 21 ‰, isoionic from 21 to 25 ‰, and hypoionic above 25 ‰. Serum osmotic level is maintained hyperosmotic below 25 ‰ and isoionic above 25 ‰.

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0.36 (7.8) HEXOSE MONOPHOSPHATE ACCUMULATION AND RELATED METABOLIC CHANGES IN UNFROZEN AND THAWED ADDUCTOR MUSCLE OF THE SEA SCALLOP (PLACOPECTEN MAGELLANICUS)

Hiltz, Doris Fraser, and W. J. Dyer (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 1, 45-52 (Jan. 1973)

This work indicates that extensive metabolic changes brought about by thawing frozen scallops (meat) may affect the quality of the thawed product. During chill storage of the meats (adductor muscle) of scallops the hexose monophosphates (glucose-6-phosphate [G6P], fructose-6-phosphate, and glucose-1-phosphate) accumulated postmortem; they increased from only traces at death to levels totaling about 10 μmole/g. after 8-10 days. G6P accounted consistently for 80-85% of the total hexose monophosphate in unfrozen (chilled) and thawed meats. Quick freezing the meats any time postmortem did not affect the level of hexose monophosphates or related metabolic constituents. When the muscle is frozen prerigor and then thawed, either slowly or rapidly, considerable formation of G6P occurs and the subsequent rate and extent of G6P production is markedly accelerated. Thawed meats stored 1-2 days at 5° C. accumulated high levels of G6P (~20 μmole/g.); these high levels appear to cause burned flavors, odors, and discolorations in the cooked thawed meats. Some hypoxanthine (Hx) and octopine formed while the prerigor-frozen muscle was thawing; however, the subsequent rate of Hx accumulation at 5° C. was three times faster in the thawed meats than in the unfrozen meats. When these meats were frozen postrigor, thawing resulted in negligible

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0.35 (9.13)

During the winter (November through February) serum osmotic level is elevated and the crabs would most likely be hyperosmotic over the entire salinity range (32 ‰ to fresh water). The serum chloride would likely be hyperionic to the medium over the entire salinity range.
[4 figures, 5 tables, 42 references] FTP

0.35 SOME PHYSICO-CHEMICAL CHARACTERISTICS OF CARP MYOSIN B
Pyeun, Jae Hyeung
Bull. Kor. Fish. Soc. 4, No. 2, 57-62 (1972) [9 figures, 13 references]
Korean Scientific Abstracts 4, No. 5, Abstract No. 72/541, 157 (Oct. 1972)

The physical and chemical characteristics of natural actomyosin extracted from the dorsal muscle of the carp are described. FTP

0.36 (7.8)

change in concentrations of the metabolites; the subsequent patterns of change during storage differed little from those in the unfrozen muscle, except that Hx accumulation was more rapid. Hx may possibly serve as an index of quality in thawed scallop muscle.

These results emphasize the inadvisability of thawing scallop meats for retail sale. Furthermore, it would be desirable to cook scallop meats from the frozen state to preserve the flavor and textural qualities of prerigor quick-frozen muscle.
[5 figures, 28 references] FTP

0.33 ELECTROPHORETIC STUDY OF SERUM PROTEINS AND CRYSTALLIN OF MERLUCHE OF THE NORTHWEST AFRICAN COAST (7.1)
Pichot, P. (Inst. Pêches Marit., Sete, France)
Chemical Abstracts 77, No. 17, 111756k (Oct. 23, 1972)

0.35 (9.13) CALCIFICATION AND SYNTHESIS OF SKELETAL ORGANIC MATERIAL IN THE CORAL, POCILLOPORA DAMICORNIS (L.) (ASTROCOENIIDAE, SCLERACTINIA)

Young, Stephen D. (Dept. of Zoology, University of California, Los Angeles, CA 90024)
Comparative Biochemistry and Physiology 44, No. 2A, 669-672 (Feb. 1, 1973)

The greater mass of the coral skeleton consists of aragonitic calcium carbonate crystals, but a significant amount of organic material of unknown function is also present. In the present study an examination was made of the relationship between new mineral deposition and the synthesis of new skeletal organic material in the coral P. damicornis (L.). In the tests, an attempt was made to inhibit protein synthesis with puromycin. The coral species contains protein, lipid, and chitin in the skeletal organic material.

The tips of the coral branches were incubated in the light in sea water containing $Na_2{}^{14}CO_3$ in the presence of puromycin dihydrochloride. Under such conditions, without puromycin, carbonate is incorporated directly into the skeletal mineral, and indirectly, through the symbiotic algae of the coral, into animal tissue and the skeletal organic material. In that way, the mineral and the organic material become labeled with ^{14}C. In acid, the mineral ^{14}C is released as CO_2; thus, the radioactivity in organic material is separated from the radioactivity in mineral material.

A significant correlation was found between synthesis of organic material and the deposition of calcium carbonate. Puromycin did not have a significant effect. Apparently, there is an interaction, before or during deposition, of skeletal organic material and mineral carbonate in the coral.
[1 figure, 19 references] FTP

0.36

metabolism. The ratio of ASA to DHA is an indicator of the extent of oxidation of ASA. The results of this analysis indicated that there is 30 times less oxidation of ASA to DHA in white muscle than red muscle. In contrast, in the red muscle, DHA is irreversibly hydrolyzed to DKA to an extent 5 times greater than in white muscle. ASA and DHA prevent oxidation of fats at double bonds and have antiscorbutic properties.

Postmortem changes or the effects of 0° C. storage for 1 week include: an increase in fat content in white muscle but not in red; ASA to DHA ratios decreased in both; the DHA to DKA ratio increased in white muscle and decreased in red; the iodine number increased three to four times in red muscle and did not change in white. Changes in iodine number and ascorbic acid content in these muscles are important as quality indicators from a nutritional point of view.
[5 tables, 27 references] SW

0.35 EFFECTS OF IONIC STRENGTH AND pH ON NEUTRAL SALT-SOLUBLE COLLAGEN FROM SPERM WHALE NOSE CARTILAGE (1.953)
Kubota, Minoru, Naoyuki Uchida, and Shigeru Kimura (Tokyo Univ. Fish., Tokyo, Japan)
Chemical Abstracts 78, No. 6, 31428k (Feb. 12, 1973)

0.38 PHOSPHOLIPASES OF MARINE INVERTEBRATES--I. DISTRIBUTION OF PHOSPHOLIPASE A

Vaskovsky, V. E., and Z. S. Suppes (Institute of Biologically Active Substances, Far East Science Centre Academy of Sciences of the U.S.S.R., Vladivostok-22, U.S.S.R.)
Comparative Biochemistry and Physiology 43, No. 3B, 601-609 (Nov. 15, 1972)

[The phospholipids are common in organisms and participate in important biochemical functions. They are the most polar of lipids reacting with either water soluble proteins or nonpolar lipids. They function to maintain the colloidal state of protoplasm; they are involved in intercellular transport; and they may be used in maintaining acid base balance. Phospholipids are abundant in egg yolk, myelin sheath of nerve, blood plasma and red blood cell membranes, and mitochondria. They are generally not found in depot fat. Lecithin is an example of a phospholipid.

Phospholipases are enzymes that catalyze phospholipid hydrolysis. They also are widespread in nature originating in plants, bacteria, snake venom, and organs of various animals. These enzymes act by removing the fatty acids in the phospholipid molecule; if the fatty acid is in the 8 position, the enzyme is called phospholipase A. Removal of the fatty acid in the 8 position of lecithin results in the product lysolecithin, a strong detergent and hemolytic agent.] Phospholipase activity in invertebrates has been reported to a limited extent.

The enzyme activity of 46 species of marine invertebrates, collected from Posiet Bay, Sea of Japan, were investigated. The preparations to be tested were

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0.39 ORGANIZATIONAL CHANGES IN PHOSPHOLIPID MULTIBILAYERS INDUCED BY UNCOUPLERS OF OXIDATIVE PHOSPHORYLATION: A SPIN LABEL STUDY

Verma, Surendra P., Henry Schneider, and Ian C. P. Smith (Div. of Biological Sciences, National Research Council of Canada, Ottawa, Canada K1A OR6)
Archives of Biochemistry and Biophysics 154, No. 1, 400-406 (Jan. 1973)

A spin probe was used to study the effect of uncouplers of oxidative phosphorylation on the degree of organization of phospholipids in hydrated multilayers. Disruptive effects were observed which were dependent on pH, time, and the presence of cholesterol. Egg lecithin films containing no cholesterol had maximum disorganization at pH 4.0 regardless of the uncoupler used. The effect of uncouplers on the probe disorganization varied with time of exposure. These time effects indicated that relative movements of uncoupler, probe, and lipid molecules occur to produce new lipid organizations that are different from those after first exposure to uncoupler. The uncouplers used were 2,4-dinitrophenol, pentachlorophenol, and dicumarol.
[8 figures, 30 references] FTP

0.38 SIMULTANEOUS PARTIAL PURIFICATION OF STEROL ESTER HYDROLASE AND LIPASE FROM RABBIT PANCREAS

Morin, Robert J. (Dept. of Pathology, Los Angeles County Harbor General Hospital, Torrance, CA 90509)
Lipids 7, No. 12, 795-798 (Dec. 1972)

During work on the purification of a sterol ester hydrolase from rabbit pancreas, the author noted that lipase activity (glyceryl ester hydrolase) closely paralleled the activity of the sterol ester hydrolase, particularly when preparations which were not delipidated were used. Lipase has been used to help purify certain enzymes to free them from bound lipid material. It would be useful, therefore, to have available a combined preparation of lipase and sterol ester hydrolase. The procedure described in this paper is a rapid method for the simultaneous partial purification of these enzymes.

The sterol ester hydrolase and lipase from rabbit pancreatic aqueous extracts were partially purified simultaneously as follows: They were initially precipitated by a 50% ammonium sulfate preparation, followed by chromatography with sodium taurocholate on a 10% agarose gel column (0.5 million exclusion limit), followed by precipitation of both enzymes with heparin and $MnCl_2$. Sterol ester hydrolase was purified 39-fold and lipase was purified 42-fold (compared to initial extract). The two enzymes are similar in that both are able to act on emulsified or micellar substrates, require bile salts as essential cofactors, and in the presence of lipids apparently form high molecular weight lipoprotein complexes that enable their parallel purification by the sequence described in this report.
[1 figure, 1 table, 10 references] FTP

0.4 (6.190) ANTIBIOTICS AS FEEDSTUFF ADDITIVES: THE RISK-BENEFIT EQUATION FOR MAN

Kiser, J. S., G. O. Gale, and G. A. Kemp (American Cyanamid Company, Agricultural Division, Princeton, N.J.)
Critical Reviews in Toxicology 1, Issue 1, 55-99 (Sept. 1972)

This review is concerned with the use of antibiotics in animal feeds for improving animal health and growth. The toxicology of some of the antibiotics used in feed and some of the implications for man are also discussed.

For economic reasons, antibiotics have been used commercially in farm animal feed for about 20 years. Although the justification for the use of antibiotics is economic, the overriding consideration is the need to maintain the efficient system of intensive animal agriculture currently practical in the United States. During the past 30 years, increases in the value of land, cost of capital facilities (including equipment), and the rising price of and scarcity of labor have required intensification and concentration of livestock raising. The concentration of and ownership of animals have been particularly notable in the poultry and beef cattle industries. Apparently, the density of animals reared in confinement and the stress imposed during shipping of animals to central rearing facilities imposes situations conducive to the spread of infectious diseases. Quite likely, intensive rearing of farm animals would be impossible without the use of disease-preventing chemicals (such as the antibiotics used in feed).

Before it can be used commercially, an antibiotic intended for animal feed use must undergo extensive studies to determine the safety to animals and its fate

0.39 ISOLATION AND IDENTIFICATION OF NATIVE AUXINS IN MARINE ALGAE
(6.32)

Abe, Hiroshi, Masaaki Uchiyama, and Rokuro Sato (Dept. of Plant Protection, Tokyo University of Agriculture and Technology, Fuchu, Tokyo, 183, Japan)
Agricultural and Biological Chemistry 36, No. 12, 2259-2260 (Dec. 1972)

[An auxin is a plant hormone. It is an organic substance which promotes growth along the longitudinal axis when applied in low concentrations to shoots of plants. The most widely occurring auxin is indole-3-acetic acid (IAA). Its presence has been demonstrated by biochemical tests or chromatography in a wide variety of flowering plants, algae, and fungi. Abstractor's note]

In studies of plant growth regulators in marine algae, auxinlike substances were found in the following species: Ulva pertusa (Kjellman), Undaria pinnatifida (Suringar), Gelidium amansii (Lamouroux), Hizikia fusiforme (Okamura), and Eisenia bycyclis (Setchell). Isolates from U. pinnatifida were examined and identified as auxins. About 10 μg. of the purified material was recovered from 1 kg. of fresh algae, in two fractions: A and B. After subjecting the two fractions to ultraviolet light the absorption spectra appeared to be similar to indole derivatives. Stepwise decomposition of fraction A to methyl indole-3-acetate and fraction B to methyl indole-3-carboxylate gave conclusive evidence that their structures were similar to those of auxins. The active fraction (A) was found to promote the growth of coleoptile sections of members of the genus Avena (oats), a standard test for auxins.
[2 figures, 1 table, 3 references] SW

0.4 (6.190)

after administration. The antibiotics approved for animal use must either disappear completely from animal tissues or remain in amounts too small to have any significant effect. There are no known instances of harmful effects in man resulting from antibiotic residues in meat. Serious side effects following oral administration of these antibiotics to humans are rare. Parenteral use has resulted in some incidence of serious side effects, and these cases have been frequently, but incorrectly, cited as potential hazards from the use of antibiotics in animal feed. It is clear, then, that the benefits derived from the use of antibiotics in animal feeds (economic and improved health of the animals) are in no way offset by any demonstrated risk to the health of the animal or of man.
[2 figures, 28 tables, 83 references] FTP

0.39 BIOCHEMICAL STUDIES ON MARINE ALGAL CONSTITUENTS. II. EVALUATION OF THE EXTRACTION AND PURIFICATION OF ALGINIC ACID FROM CYSTOSEIRA BARBATA

Abdel-Fattah, A. F., M. M. Hussein, and H. M. Salem (Lab. Microbiol. Chem., Natl. Res. Cent., Cairo, U.A.R.)
Chemical Abstracts 77, No. 15, 98533p (Oct. 9, 1972)

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made from tissues of the hepatopancreas, intestines, and gonads. They were ground in sand and acetate buffer and centrifuged. The supernatant fluid was tested on the following phospholipid substrates: phosphatidyl choline, phosphatidyl ethanolamine, and sphingomyelin isolated from egg yolk. Chromatography techniques were used to determine the products of change; chemical tests were used to detect free fatty acids, choline, and choline containing lipids.

Only phospholipase A was detected in the preparations, and phosphatidyl choline was the phospholipid hydrolyzed most actively. Of the distribution of phospholipase in the organs of the invertebrates, preparations from hepatopancreas and intestines were more active than those from the gonads. The most active preparations were from tissues of representatives of the Gastropoda, the Polychaeta, and the Echinoidea. The least active were preparations from representatives of the Crustacea.
[1 table, 32 references] SW

0.38 METHOD FOR THE DETERMINATION OF LIPOPROTEIN LIPASE IN POSTHEPARIN PLASMA AND BODY TISSUES UTILIZING A TRIOLEIN-COATED CELITE SUBSTRATE

Posner, Israel, and Virgilio Bosch (Hosp. Cent. Fuerzas Armadas, Caracas, Venezuela)
Chemical Abstracts 76, No. 7, 31609d (Feb. 14, 1972)

0.4 THE EFFECTS OF LOCAL ANESTHETICS ON LIPID MULTILAYERS. A SPIN PROBE STUDY

Butler, K. W., H. Schneider, and Ian C. P. Smith (Div. of Biological Sciences, National Research Council of Canada, Ottawa, Canada K1A OR6)
Archives of Biochemistry and Biophysics 154, No. 2, 548-554 (Feb. 1973)

Results of other work indicate that the effectiveness of anesthetics depends upon their interaction with the lipid, not with the protein, portion of membranes. Local anesthetics can block the transmission of impulses by nerves, alter the transport properties of skin, and change the osmotic fragility of red cells. These effects depend upon the pH of the aqueous medium and on the permeability of lipid films and liposomes.

The effects of a series of local anesthetics on lipid multilayers formed from ox brain white matter lipids were investigated using a spin-labeled analog of cholestane as the monitor of molecular structure. The local anesthetics, with a constant concentration and increasing pH values, disordered the films. The anesthetics promoted the formation of ordered multilayer arrays and increased their thermal stability in films formed from lipids with reduced cholesterol content. These effects were produced by a concentration of anesthetic that was lower than that required to disorder the films and was pH dependent. The authors concluded that local anesthetics can either stabilize or disorder lipid films depending on the lipid, the concentration of the anesthetic, and the pH of the bathing solution. Local anesthetics may prevent the transmission of nerve impulses when they stabilize lipid bilayers and promote thermal stability.
[8 figures, 28 references] SW

0.5

ECOLOGY OF VIBRIO PARAHAEMOLYTICUS IN CHESAPEAKE BAY

Kaneko, Tatsuo, and Rita R. Colwell (Dept. of Biology, Georgetown University, Washington, DC 20007)
Journal of Bacteriology 113, No. 1, 24-32 (Jan. 1973)

The purpose of this study was to determine the ecological niche of V. parahaemolyticus in Chesapeake Bay in the natural environment; its habitat and role were examined in the natural cycles of plankton, water, and sediment. In addition, the mechanisms whereby the organism survives the winter were studied. Samples were collected monthly from Dec. 1970 to Aug. 1971 at the Rhode River area in Chesapeake Bay. Bottom sediment, water, and plankton samples were collected.

The incidence of V. parahaemolyticus (and related vibrios) correlated with water temperature; the organisms could not be detected in the water column during the winter months, but they were present in the sediment. From late spring to early summer (water temperatures 14°±1° C.) the vibrios that over-wintered in the sediment were released from the bottom communities, attached themselves to the zooplankton, and proliferated as the temperature of the water rose. The temperature of the water column in the range of 14° to 19° C. seemed to be critical in the annual cycle of the vibrios.

Bacterial counts of zooplankton were temperature dependent. The bacterial population associated with the zooplankton was found predominantly on the external surfaces. Furthermore, this bacterial population was different from that of the sediment. The Vibrio spp. and related organisms comprised nearly the total bacterial population associated with the zooplankton during the midsummer months.

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CLOSTRIDIUM BOTULINUM AND SMOKED FISH PRODUCTION: 1963-1972

Pace, Paul J., and Edward R. Krumbiegel (City of Milwaukee Health Dept. 841 N. Broadway, Milwaukee, WI 53202)
Journal of Milk and Food Technology 36, No. 1, 42-49 (Jan. 1973)

Three conditions must exist for botulism to occur: (1) the spores must be present in the environment and gain access to the food, (2) viable spores must remain in the food after processing, and (3) the food must be exposed to conditions that permit germination and subsequent production of toxin. Smoked fish was produced in the Great Lakes area for about 75 years before the first case of human botulism arising from ingestion of such fish was recognized and reported. It appears that processing and distributing practices may have been altered some time about 1960. The smoked fish prepared in the last 10 to 15 years may have had lower salt levels and higher moisture contents than that processed previously. Survey studies conducted since 1963 demonstrated that type E was the most prevalent toxin type in fish and environmental samples from the area. Toxin types A and C, and nonproteolytic type B, were found only occasionally in fish from the Great Lakes. Considerable research has been carried out on the physiology of C. botulinum type E and its spore form, and on practical inoculated pack studies. The authors reviewed these research data and collated them with data derived from studies designed to evaluate the Milwaukee Smoked Fish Ordnance. Both groups of data apparently sustained the validity of the Milwaukee Ordnance.
[1 table, 61 references]

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PUBLIC HEALTH PROBLEMS ASSOCIATED WITH BARBECUED FOOD. A REVIEW

Todd, E., and H. Pivnick (Food Research Laboratories, Health Protection Branch, Ottawa KIA OL2, Ontario, Canada)
Journal of Milk and Food Technology 36, No. 1, 1-18 (Jan. 1973)

Barbecued foods are ready-to-eat products sold in grocery stores, restaurants, take-out shops, and outdoor stalls. Barbecued foods have caused 62 known outbreaks of food poisoning throughout the world. Freshly barbecued foods, adequately cooked, contain few bacteria, but subsequent handling and storage in inadequate holding facilities increases the risk of bacterial contamination. The authors consider temperature control as the best way of preventing food poisoning from barbecued foods. They recommend that barbecued food should be stored at ≤40° or ≥140° F.
[10 tables, 94 references]

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VIBRIO PARAHAEMOLYTICUS METHODOLOGY FOR ISOLATION FROM SEAFOODS AND EPIDEMIC SPECIMENS

Fishbein, Morris, and Barry Wentz (Div. of Microbiology, Bureau of Foods, Food and Drug Administration, Washington, DC 20204)
Journal of Milk and Food Technology 36, No. 2, 118-123 (Feb. 1973)

The identity of V. parahaemolyticus was established in 1963. The organism is a halophilic, enteropathogenic, gram-negative, facultative anaerobe inhabiting most of the oceans. It has been found in many species of fish, crustaceans, and shellfish harvested on all coasts of the United States. A succession of four foodborne outbreaks of V. parahaemolyticus occurred in Maryland after consumption of steamed crab and crab salad in 1971. The organism was isolated from contaminated food and recovered from patients. In Japan, it is the major bacterial cause of epidemic gastroenteritis.

A newly revised procedure in the bacteriological analytical manual of the Food and Drug Administration for the analysis of seafood samples and epidemic specimens was developed for the isolation and identification of this organism. A 50-gram sample of seafood plus 450 ml. of 3% NaCl are blended serially and diluted. Epidemic specimens may be prepared in the same manner or dispersed in Cary-Blair transport medium. The seafood dilutions are inoculated into glucose salt Teepol broth and incubated overnight at 35° C. On the second day, the three highest dilutions showing growth are streaked onto thiosulfate-citrate-bile salts-sucrose agar (TCBS). The plates are incubated overnight at 35° C. The growth on the plates or the epidemic specimen growth in TCBS is inoculated into triple sugar iron agar (TSI), motility agar, trypticase soy agar, and trypticase soy broth.

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0.5 DISTRIBUTION OF VIBRIO PARAHAEMOLYTICUS IN THE NATURAL ENVIRONMENT

Liston, J. (Institute for Food Science and Technology, College of Fisheries, University of Washington, Seattle, WA 98195), and J. Baross
Journal of Milk and Food Technology 36, No. 2, 113-117 (Feb. 1973)

The principal source of V. parahaemolyticus is the sea. It has been isolated from patients ill with gastroenteritis after eating uncooked or lightly processed fish and shellfish. It has been identified as the cause of disease in crabs, shrimp, oysters, and fish.

The organism is most abundant in inshore and estuarine areas where temperatures rise seasonally to levels that permit growth of the organism. Studies in Japan and the United States of coastal areas have shown a direct relationship between ambient temperature and abundance of the organism; the abundance correlates with the seasonal increase in food poisoning, caused by the organism, in Japan. In North America it is most abundant in shellfish and waters of high-organic content; it has also been found in sediment in inshore areas. Information from market seafood samples indicates very low incidence of the organism on fin fish in Europe and North America. On fresh and frozen shellfish in U.S. markets limited data indicate sporadic high incidence on shrimp, crab meat, oysters, and clams.

The organism is one of a group of phenotypically similar, mildly halophilic, mesophilic vibrios. The group is difficult to separate into clearly distinguishable species, and many types mimic V. parahaemolyticus closely. On genetic analysis organisms which are identical in their biochemical reactions to V. parahaemolyticus have proved to be another species. The authors suggest that all published accounts of the incidence and distribution of the organism should be read with caution.
[5 tables, 36 references] SW

0.5 (0.4)

After incubation and examination, an isolated culture is selected that is composed of gram-negative, poorly flagellated, motile, rod shapes producing an alkiline slant and acid butt on TSI and negative for hydrogen sulfide and gas production. This culture is further examined biochemically. A biochemical profile of the organism is shown. An important test for pathogenicity is the appearance of a specific beta hemolysin on Kanagawa agar. Serotyping the unknown organism can be valuable in epidemiological studies. The antigenic groups of V. parahaemolyticus are presented in table form.

The authors suggest that the multiplicity of tests for identifying the organism should be unified and the data reconciled to one standard test method.
[5 figures, 4 tables, 7 references] SW

0.5 MYSTERIES AND MISCONCEPTIONS OF STERILIZATION BY STEAM AND ETHYLENE OXIDE

Ernst, Robert R. (Castle Co., Rochester, N.Y.)
Chemical Abstracts 78, No. 2, 7764w (Jan. 15, 1973)

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Apparently, the ecological role of Vibrio spp., including V. parahaemolyticus, is significant with respect to their ability to digest chitin and in relation to the population dynamics of zooplankton in Chesapeake Bay. The surface of the plankton is coated with its metabolic products which are used for food by the attached bacteria. Because Vibrio spp. are chitinoclastic they can decompose plankton, and the organic material thus released is made available for recycling to the environment. [3 figures, 5 tables, 35 references] FTP

0.39 DETERMINATION OF ZINC-65 SPECIFIC ACTIVITY IN VARIOUS TISSUES OF THE CALIFORNIA SEA MUSSEL, MYTILUS CALIFORNIANUS (1.88)

Larsen, Ingvar Lauren (Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98385s (Oct. 9, 1972)

0.7 EVALUATION OF LINEAR PROGRAMMING TECHNIQUES IN FORMULATING HUMAN DIETS WITH RAT-FEEDING TESTS

Wilcke, H. L., D. T. Hopkins, L. F. Reutzel, and L. W. Declue (Central Research, Ralston Purina Company, St. Louis, MO 63188)
Journal of Nutrition 103, No. 2, 179-188 (Feb. 1973)

Diets in which the chief source of calories was either rice or wheat were formulated by linear programming to meet the requirements of the preschool child for energy, protein and amino acids. Chicken, fish, beef, eggs, whole milk, soy flour and amino acids were used to supplement the cereals to provide the necessary levels of protein and amino acids. Control diets based on egg protein and glucose were formulated to either satisfy or provide an excess above these requirements. The diets were compared in rat feeding tests. Rats fed diets based on wheat supplemented with intact protein or the amino acids lysine and methionine grew at a rate similar to those fed the control diets formulated to just meet the requirements. Rats fed diets based on rice supplemented with intact protein grew at a rate considerably faster than the control diet and also made comparatively faster growth than those fed the wheat diets. The studies indicate that linear programming can be used successfully to formulate human diets based on wheat. However, due to insufficient information on the nutritive value of rice and on the correlation between analytical and nutritive value of rice for humans, linear programming of diets based on rice was not completely successful as measured by uniformity of results. Requirements can be met by fortification of wheat with lysine and possibly methionine with no additional intact protein whereas fortification of rice with lysine alone is not satisfactory.
[9 tables, 17 references] Authors' abstract

0.7 (7.42) CHROMIUM IN FOODS IN RELATION TO BIOLOGICAL ACTIVITY

Toepfer, Edward W., Walter Mertz, Edward E. Roginski, and Marilyn M. Polansky (Nutrition Institute, Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, MD 20705)
Journal of Agricultural and Food Chemistry 21, No. 1, 69-73 (Jan.-Feb. 1973)

This paper reports on the chromium analyses of selected food samples and on the biological activity of chromium extracts of these foods. The food items were obtained from local sources. The samples were hydrolyzed with hydrochloric acid or extracted with 50% ethyl alcohol. A modified colorimetric procedure for chromate [J. A. Dean and M. L. Beverly, Anal. Chem. 30, 977 (1958)] was used for chromium analyses. The relative biological activity of the extracts was evaluated by measuring the carbon dioxide produced from glucose oxidation using glucose-1-^{14}C in the presence of rat epididymal tissue and 100 microunits of insulin [W. Mertz, Physiol. Rev. 49, 163 (1969); and E. E. Roginski, E. W. Toepfer, M. M. Polansky, and W. Mertz, Fed. Proc. Abstr. 695 (1970)].

No significant relationship existed between total chromium and biological activity. A significant relationship existed for chromium in the alcohol extracts of meats, fungi, seeds, and seafoods (fruits and vegetables were not included in these tests). The authors proposed an evaluation of the foods based on these data. Data on the calculated chromium biological values of some of the foods tested are shown in the table that follows.

(over)

0.7 (5.124) EFFECT OF PROTEIN AND METHIONINE ON VITAMIN A LIVER STORAGE IN RATS FED DDT

Young, M. L., G. V. Mitchell, and C. R. Seward (Division of Nutrition, Food and Drug Administration, Dept. of Health, Education and Welfare, Washington, DC 20204)
Journal of Nutrition 103, No. 2, 218-224 (Feb. 1973)

The interrelationships among dietary protein, DDT, vitamin A, and DL-methionine were investigated in male weanling Holtzman rats fed purified diets, with either casein or soybean isolate as the protein source, for 4 weeks. Each protein was fed in the basal diet at a level of 10 or 20% with the following variation: A) basal, B) basal + 0.4% DL-methionine, C) basal + 200 ppm DDT, and D) basal + 0.4% DL-methionine + 200 ppm DDT. At the level of either 10 or 20% soy protein, DDT decreased the storage of vitamin A in the liver by 32%; the addition of methionine did not counteract this effect. At the 20% level of casein, storage of vitamin A in the liver was decreased 42% in rats fed DDT; however, in rats fed methionine plus DDT, there was only a 16% decrease in liver vitamin A as compared with the control rats (basal diet A). Methionine caused a significant increase in the amount of DDT, DDE, and DDD stored in the liver when given with either level of soy or with the 10% level of casein; at the 20% level of casein, methionine had no effect. These studies demonstrate that the degree of toxicological stress due to DDT exposure depends in large measure on the quality and quantity of dietary protein. [5 tables, 22 references] Author's abstract

0.7 (0.4) THE TWO FACES OF SELENIUM -- CAN SELENOPHOBIA BE CURED?

Frost, Douglas V. (Nutrition Biochemistry, Brattleboro, VT 05301)
Critical Reviews in Toxicology 1, Issue 4, 467-514 (Oct. 1972)

Selenium (Se) is the most toxic but least plentiful of the nutrients in the earth's crust. It has two faces: the one, good--selenium is nutritionally important, having biological activity similar to that of tocopherols, and the other, bad--selenium in excess is poisonous to animals. Several decades ago a research study on rats seemed to implicate selenium as a carcinogen. The interpretation of this one study study stood without challenge until the 1960's. The present review gives particular attention to the fact that Se was not initially shown to cause cancer, and that claims for the induction of cancer by Se seem to be unsupported by critical evidence. Also, a brief review is given of the toxicity of selenium.

The author believes that the good face of selenium may prove to be of great importance. Further testing must be carried out to determine the relation of Se to inhibition of cancer, to aging, and to susceptibility to coronary disease and sudden death. The possible value of Se for any of these aspects depends upon the supportive effects of vitamin E, or of those antioxidants that mimic its antioxidant effects. The author points out in this review that certain unwarranted apprehensions and preconceptions about Se appear now to be diametrically opposed to the nutritional and biochemical facts. Eventually, as proof of the fundamental

(over)

1.0152 A MARINE BIOLOGICAL SURVEY OF SOUTHERN TAIWAN WITH EMPHASIS ON CORALS AND FISHES

Jones, Robert S., Richard H. Randall, Ying-min Cheng, Harry T. Kami, and Shiu-man Mak
Special Publication No. 1, Institute of Oceanography, College of Science, National Taiwan University, Taipei, Taiwan, Republic of China (1972), 93 pp. Price not given.

This survey covers the southern tip of the island, about 60 kilometers of shallow benthic habitats from Hai-k'ou on the west coast around the southern tip of the island at O-luan-pi and northward along the east coast to Ch'u-feng-pi. This report is divided into two parts. The first part is a general survey of benthic communities, reef development features, shoreline features, and the limits of a recently discovered crown-of-thorns starfish Acanthaster planci (L.) infestation. The second part describes the collection of corals and fishes and includes a series of density observations on the Acanthaster population.
[38 figures, 5 tables, 46 references] FTP

0.7 (0.4)

nutrient value of Se develops, many uses for selenicals in preventive medicine, or possibly even in foods, may arise.

Various study approaches are recommended to achieve the proper understanding relative to Se, as follows: (1) Test the nutritional value of levels of selenite Se, from marked deficiency to maximum tolerated level, against all types of cancer induction. (2) Explore further the validity of the indication that a low exposure to Se in foods and in the environment is reflected in lower blood and tissue levels of Se and that this deficiency increases susceptibility to cancer and to heart and circulatory problems. (3) Establish whether exposure to heavy metal (Pb, Hg, Cd, and Ni) increases signs of Se deficiency in animals on marginal Se diets. (4) Find out whether increase in acidification of waters and soils by SO_2 and NO_2 tends to decrease Se availability and Se uptake by plants. (5) Develop animal models to test whether combined Se-vitamin E deficiency causes sudden death. Once it is accepted that the safe uses of selenicals offer great promise against disease, new research horizons can emerge in nutrition, preventive medicine, and public health.

[4 figures, 4 tables, 267 references] FTP

1.82 (1.01113) THE CLAM FISHERIES OF BRITISH COLUMBIA

Quayle, D. B., and N. Bourne (Fisheries Research Board of Canada Biological Station, Nainaimo, British Columbia, Canada)
Bulletin No. 179, 70 pp. (1972). Fisheries Research Board of Canada, Information Canada, Ottawa, K1A 0S9, Canada. Price $3.00.

The clam harvest is not large but is important to communities along the coast of British Columbia. The value of landings has been up to $220,000 annually, and as much as 8 million pounds have been harvested annually. The fishery is declining, however, because of over harvesting. The most important species taken is the butter clam; three other species are commonly taken also.

This bulletin will be attractive to those interested in clams and the clam industry. Some of the highlights follow, beginning with the biology of the clam. Pollution and toxicity of clams are described with emphasis on conditions on the beaches of British Columbia. Paralytic shellfish poison and detoxification methods are covered in relation to legal requirements. A history of the clam fishery is presented--before 1900 and after--with descriptions of canneries and fishing methods. In addition to the butter clam, the littleneck, Manila, and razor clam are taken. The regulations regarding harvesting are included for these species also. The results of a deepwater clam survey are provided. Details of mechanical harvestors are covered. A list of suggested reading is given for further study. The bulletin is fully illustrated with photographs, diagrams, and maps.

SW

0.7 (7.42)

Food sample (edible portion as selected)	Relative chromium biological value	Food sample (edible portion as selected)	Relative chromium biological value
Yeast, Brewers (dried)	44.88	Shrimp	2.03
Liver, calf's	4.52	Grits	1.97
Cheese, American	4.39	Lobster	1.95
Bread, whole wheat	3.59	Chicken leg	1.89
Beef round	2.89	Haddock	1.86
Oysters	2.43	Chicken breast	1.75
Cornmeal, yellow	2.35	Skimmed milk	1.59

[1 figure, 2 tables, 6 references] FTP

0.8 (9.19) BACTERIA: FRIENDS OR FOES?

Woods, George A. (Betz Laboratories, Inc., Somerton Rd., Trevose, PA 19047)
Chemical Engineering 80, No. 6, 81-84 (Mar. 5, 1973)

Bacteria can cause problems in water supplies, especially in wells and pipelines. Bacteria are also useful in reducing sewage volume and deactivating harmful chemicals. When bacteria are the cause of troubles in water systems the symptoms may appear to be due to other causes. Careful analysis is required to determine the cause of the problems. In an industrial water supply, the plugging of a filter with elemental sulfur was attributed to leakage from nearby tanks containing high-sulfur crude oil. More careful analysis revealed that the sulfur in the blocked filter was due to the presence of sulfur bacteria, Thiobacillus thioxidans. To eliminate the extensive contamination of this water supply, 1 ton of chlorine was required. Other bacteria can plug a water supply by forming deposits of ferric hydroxide on the walls of pipes. Corrosion in a water system can be caused by sulfate-reducing or sulfide-forming bacteria.

A control program is required to determine the causative factors of water system problems and also the corrective action to be taken. If the problems are caused by microorganisms then the correct choice of a biocide must be made. Identification of the organism by proper techniques will assist in determining the chemicals to destroy it.

[4 photographs, 2 tables, 10 references] SW

1.93 THE PACIFIC RIDLEY TURTLE IN JAPANESE AND ADJACENT WATERS

Nishimura, Saburo, Kazuo Shirai, Takeshi Tatsuki, and Chiyota Sugihara
Publications of the Seto Marine Biological Laboratory 19, No. 6, 415-426 (Mar. 1972)

Taxonomy of sea turtles of the tribe Carettini Zangerl 1958 (family Cheloniidae) was uncertain until 1967 when the loggerhead turtle, Caretta caretta (L.) and the Pacific Ridley turtle, Lepidochelys olivacea (Eschscholtz) were distinguished from each other. The occurrence of each turtle in Japanese waters began to be recorded separately also in that year.

Since 1967 the author and his collaborators have been searching for records of occurrence of the Pacific Ridley turtle in order to establish distribution patterns in the western Pacific. The conclusions to be gathered from the records are (1) the Ridley turtle is not normally found in Japanese waters nor in the East China Sea; (2) its native area is in more southerly waters; (3) its two seasons of occurrence in the East China Sea represent periods of northward drift from the native area and return to southerly waters; and (4) the northward drift coincides with the seasonal hydrographic pattern in the East China Sea.

The native area of the Ridley turtle is the South China Sea. Other reports indicate an abundance of the turtles there, and off the coasts of Indochina, Malay Peninsula, and Borneo. This turtle is not confined to these areas, but ventures into offshore waters and long-term drifts. The populations of Ridley turtles in the waters of the West Indies and the Guyanas are considered to be colonies descended from individuals that have drifted from West Africa.

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2.1471 STUDY ON THE HYDRODYNAMIC PROPERTIES OF MID-WATER TRAWL--II.

Chow, Yau-Shou, Wei-Cheng Su, and Chuan-Hong Ho (Fisheries Dept., Taiwan Provincial College of Marine and Oceanic Technology)
Journal of the Fisheries Society of Taiwan 1, No. 2, 41-53 (Sept. 1972) [In Chinese; abstract, figures, and tables in English]

The authors designed and tested midwater trawl nets similar to the 440 Cobb pelagic trawl net (used in the United States) in order to introduce the use of the midwater trawl net on Taiwan otter trawlers. The nets turned out to be suitable for use in Taiwan commercial trawlers.
[21 figures, 3 tables, 12 references] FTP

2.00 STUDIES ON THE VARIATION OF THE FRESHNESS OF FISHES DURING THE STORAGE IN ICE

Jung, Hyung Gyoo, Sang Kwan Rhee, Dong Suk Jang, and Hong Jo Bak
Bulletin of the Fisheries Research & Development Agency No. 9, 85-93 (July 1972) [In Korean; abstract and tables in English]

Porgy (Pogrosomus major), pomfret (Stromateoides orgenteus Euphrasen), swellfish (Sporceroides pardalis Temminck & Schlegel, bastard (Paralichthys olivaceus Temminck & Schlegel), and shrimp (Penaeus monodomj) were stored in ice and were examined at periodic intervals until they became spoiled. Quality of the fish was determined by organoleptic tests and by objective tests for volatile base nitrogen, trimethylamine, and bacterial plate count. The organoleptic quality ratings, consisted of excellent, very good, good, slightly good, average, slightly poor, poor, and very poor.

The fish reached the slightly poor rating after 14 days for porgy, 11 days for pomfret, 10 days for swellfish, 18 days for bastard, and 7 days for shrimp. The results of the objective tests on the various species for the slightly poor state of quality are shown in the table that follows.

(over)

2.1471 THE CATCHING EFFICIENCIES OF A 21.3-METER (HEADROPE) STANDARD WING TRAWL AND A 21.3-METER ELECTRICAL WING TRAWL IN THE SAGINAW BAY AREA OF LAKE HURON

Ellis, James E. (National Marine Fisheries Service, NOAA, Fish Farming Development Center, Rohwer, AR 71666), and Edward N. Pickering
Transactions of the American Fisheries Society 102, No. 1, 116-120 (Jan. 1973)

Studies were conducted to determine the catching efficiencies of electrified bottom trawls. In the study, the voltage gradients in the electrical trawl were determined, and the catch rates were compared to a standard trawl. Similar 21.3 m. (headrope) wing trawls were used for the standard trawl and the electrical trawl. The array of electrodes on the electrical trawl were vertical open panels spaced 1.5 m. apart and parallel to each other and positioned across the mouth of the trawl. The cathodes were located forward of the anodes. The shipboard power supply and a pulser fed the electrodes four 1-msec. pulses per second at 90 volts d.c. (anode to cathode voltage).

Measurements of the electrical field gradients showed an average voltage drop from 21.1 volts within 38.1 cm. of the cathodes to about 1.0 volt midway between the cathodes and anodes and then increased to 16.9 volts within 38.1 cm. of the anodes.

The standard trawl catch average was 40.4 kg. of fish per drag. The electrical trawl--with power on--average catch was 33.3 kg. of fish per drag; with power off, the average catch was 20.1 kg. per drag. The number of fish caught by standard trawl was greater than the catch made by electrical trawl with power

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2.00

Species	Values at the slightly poor state of quality		
	Volatile base nitrogen	Trimethyl-amine	Plate count at 20° C. (muscle)
	mg.%	mg.%	Bacteria/g.
Porgy	20	2 - 3	2.2×10^3
Pomfret	20 - 25	3 - 4	750×10^3
Swellfish	20 - 25	3 - 4	($1,800 \times 10^3$ to ($11,000 \times 10^3$
Bastard	20 and >	3	43×10^3
Shrimp	20 and >	3 and >	$1,000 \times 10^3$

[8 tables, 11 references] FTP

0.8 REMOVAL OF ODOURS BY CATALYTIC INCINERATION
(9.19)

Searles, R. A.
Envir. Pollut. Mgmt. 2, No. 7, 280-281, 283-284 (1972)
FOOD R.A. ABSTRACTS 26, No. 1, Abstract No. 197, 32 (Jan. 1973)

The use of a platinum catalyst suspended on a ceramic honeycomb for the oxidation of odorous chemicals is described. Operating costs for catalytic incineration and direct flame incineration are compared. D.B. Reprinted

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2.119 FATAL POISONING AND OTHER HEALTH HAZARDS CONNECTED WITH INDUSTRIAL FISHING

Dalgaard, J. B., F. Dencker, B. Faillentin, P. Hansen, B. Kaempe, J. Steensberg, and P. Wilhardt (Inst. Forensic Med., Univ. Aarhus, Aarhus, Denmark)
Chemical Abstracts 78, No. 2, 7398e (Jan. 15, 1973)

2.1471

on or off. The occurrence of species was about the same for either trawls, with carp dominating the catches, and alewife next in number. An interesting result of the catch study was that the mean length of carp, alewife, smelt, and yellow perch was larger in electrical trawls with power on than standard trawls, and standard trawl catches averaged greater length than electrical gear with power off.

The authors suggest that visual and tactile stimuli influence fish in avoiding trawling gear, and the electrical array was influential in their avoidance reaction. They further suggest that electrical array designs should be investigated which will give a uniform electrical gradient and offer less visual stimulus to fish.
[2 figures, 3 tables, 9 references] SW

2.143 FISH HARVESTING METHOD AND APPARATUS
(0.8)

Moise, John R. (115 Central Ave., Houma, LA 70360) (pat.)
U.S. Patent 3,714,729 (Feb. 6, 1973)

This invention consists of a frame assembly which may be supported on the bottom of a shallow depth of water to harvest catfish or crayfish or may be supported from the deck of a fishing vessel in deep water to collect fish or other marine animals. The fish are herded into a central collection zone by use of an electric field. FTP

1.93

The Ridley turtles that have been recorded in Japanese waters are considered to be subadult (based on length of carapace). The carapace of the mature Ridley turtle is 66 to 71 cm. long. The majority of those found in Japanese waters measured 45 to 58 cm. in carapace length. The ultimate fate of these turtles will be to continue drifting and perish in the barren central Pacific or become stranded on the west coast of Honshu Island.
[8 figures, 2 tables, 20 references] SW

2.1471 EXPERIMENTAL STUDIES ON THE MECHANICAL PROPERTIES OF TRAWL NET

Lee, Tsann-Jan (Taiwan Fisheries Research Institute)
Journal of the Fisheries Society of Taiwan 1, No. 2, 54-65 (Sept. 1972) [In English; abstract in Chinese]

This work dealt with the deformation of the trawl net under varying conditions. The paper gives a few examples of the construction problems involved and offers suggestions for overcoming them. The influence of the length of the cod end to the length of the head line on the shape and webbing of the net is discussed.
[11 figures, 12 references] FTP

2.1474 SET NET EXPERIMENT WITH MAJOR IMPLICATIONS FOR NEW ZEALAND

Anonymous
Commercial Fishing 11, No. 11, 4, 5, 6 (Nov. 1972) (Trade Publications, Ltd., 1 Emily Place, Auckland 1, New Zealand)

Set nets have been used to catch fish on the Japanese coast for many years. A Japanese and a New Zealand company have formed a joint venture to explore the possibilities of using set nets on the coast of New Zealand.

An experimental set net was installed at a site selected on the basis of the likelihood that it intercepted a route of fish movement. This set net consisted of the fence net and the fish trap. The fence net was anchored on the shore and extended 80 yards into the water at a right angle to the shoreline. At the seaward end of the fence net the fish trap was installed. The trap was 7 fathoms deep, 32 yards long, and 15 yards wide. The net was made of a material called saran. The fence net was 6-inch mesh saran, and the fish trap was made of 3-inch mesh. Saran has a specific gravity of 1.7 which is sufficiently heavy for nets made of the material to sink in water without additional weights.

The net is attached to buoyed wires on the surface; the wires are kept in position by sandbags. In this experimental net 100 sandbags were used, but a commercial-sized set net would be secured by 6,000 sandbags.

The experimental set net was tried in three locations along the coast not far from Whitianga, the nearest freeze-processing plant. The catches averaged two to three baskets of fish per day.

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3.19 (1.85) ECONOMIC AND TECHNOLOGICAL STUDY OF THE IRRADIATION OF SHRIMPS (CRANGON VULGARIS FABR.)

Hovart, P., P. Schietecatte, and W. Vyncke
Eurisotop Office Information Booklet 70 (Series Monographies - 19), 165 pp. (Sept. 1972). Published by the Eurisotop Office, Information and Documentation Service, Rue de la Loi 200, B - 1040, Brussels, Belgium)

Shrimp landings accounted for a high proportion of the total landings of shellfish in the European Economic Community (EEC) which included, before 1973, Belgium, France, Netherlands, and West Germany. The value of shrimp landed in these four countries in 1969 was $11,786,000. Shrimping is carried on off the coasts of the member EEC nations, and it is of economic importance to the local regions involved.

The problem of maintaining the quality of shrimp flesh is related to several factors. The composition of the flesh is as follows: average water, 70%; salt, 4%; protein, 23%; fat, 2%; and carbohydrates, 1%. The presence of moisture, protein, and carbohydrate is favorable for the growth of microorganisms. The amount of extractable nitrogen compounds in shrimp flesh are more than twice as much as in fish flesh. Uncooked shrimp contains proteolytic enzymes which appear to be more active than those in fish flesh. Cooking shrimp at temperatures of at least 100° C. for a sufficient time inactivates the enzymes and reduces the bacterial count materially. Most of the cooking is performed on the shrimping vessels at sea. To maintain the quality, refrigeration after cooking the shrimp is necessary. The possibilities of spoilage by microorganisms are numerous throughout

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3.12 STUDIES ON CURING OF MEAT PRODUCTS--II. DEGRADATION OF NITRATE AND NITRITE DURING MEAT CURING

Mori, Kazuo, Yasuo Yamamoto, Yoshiaki Akahane, and Suekazu Oyabu (Nippon Shinyaku Co., Ltd., Food Research Institute, Kyoto, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1383-1390 (Dec. 1972) [In Japanese; figures, tables, and abstract in English]

The influence of certain additives and of heat on the development of color was examined in tuna, whale, and pork meats cured with nitrate and nitrite. In nitrate-cured meat, the addition of phosphate and sucrose accelerated the reduction of nitrate to nitrite. In nitrite-cured meat the addition of phosphate and sucrose resulted in a high level of residual nitrite and the poor development of the desirable cured meat color. Ascorbic acid, sodium ascorbate, and cysteine inhibited the reduction of nitrate to nitrite; thus, a low level of residual nitrite resulted in the good development of cured meat color.

Heating the cured meat resulted in a rapid decrease of nitrite due to the reaction of nitric oxide with myoglobin. However, once the protein had become denatured, there was a steady and large decrease in the level of residual nitrite, probably due to the reaction of nitrite with free amino groups.

The degradation process of nitrate and nitrite in cured tuna, whale, and pork meats differs; however, further research is needed to determine whether the differences are species specific.

[4 figures, 3 tables, 31 references] FTP

3.2340 (8.8) THIOBARBITURIC ACID VALUE, TOTAL LONG-CHAIN FREE FATTY ACIDS, AND FLAVOR OF PACIFIC HALIBUT (HIPPOGLOSSUS STENOLEPIS) AND CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) FROZEN AT SEA

Botta, J. R., J. F. Richards (Dept. of Food Science, University of British Columbia, Vancouver, Canada), and N. Tomlinson (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, B.C.)
Journal of the Fisheries Research Board of Canada 30, No. 1, 63-69 (Jan. 1973)

The purpose of this study was to determine the effects of brine-freezing and plate-freezing at sea and subsequent frozen storage of Pacific halibut and chinook salmon upon their 2-thiobarbituric acid (TBA) values, flesh content of long-chain free fatty acids (FFA), and flavor. One lot of in-rigor fish of each species was frozen in a plate freezer at -30° C. for 3.5 hr.; another lot of each species was frozen in a 13% salt (NaCl) solution at -5.6° C. for 9.5 hr. for the salmon and for 47 hr. for the halibut. The frozen fish were then glazed using an ice-water mixture, packaged in polyethylene, and stored at -30° C. The chemical and organoleptic analyses were carried out on both the outside portion and the inside portion of the muscle. The halibut was stored 81 weeks and the salmon 77 weeks. Examinations were carried out at periodic intervals of storage.

The samples of outside muscle of the brine-frozen fish generally had higher TBA values than did the plate-frozen samples; the differences were most pronounced at intermediate storage times (26-45 weeks). The total FFA level was significantly greater in the plate-frozen samples than in the brine-frozen samples of halibut. In both the halibut and salmon, the FFA level was significantly

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3.12 FISH PROCESSING

Fukumoto, J. (pat.)
Japanese Patent 4720362 [sic]
Food Technology 27, No. 3, 92 (Mar. 1973)

Frozen fish and shellfish are thawed and then treated with a solution containing an acid stable protease, that may be mixed with ribonuclease. The treatment prevents odor formation during cold storage of the fish. FTP

3.2340 (8.8)

greater in the outside muscle than in the inside muscle. The total FFA level for both species significantly increased with length of frozen storage.

At intermediate storage times for both species, significant flavor differences existed between the brine-frozen and plate-frozen samples of outside muscle. For inside muscle of halibut, the significance of flavor differences increased with storage time. For inside muscle of salmon, flavor differences were consistently nonsignificant.

Taste panel results and TBA values of the outside muscle of both Pacific halibut and chinook salmon showed that the plate-frozen samples were preferred to the brine-frozen samples at the first sampling period (9 or 14 weeks), but this preference declined as storage time increased until at later sampling periods the brine-frozen samples were preferred.
[4 figures, 4 tables, 18 references] FTP

3.12 ON THE EFFECTIVENESS OF EDTA IN PROLONGING THE SHELF LIFE OF FRESH FISH

Kusui, T., and Löytömaki, M.
Z. Lebensmitteluntersuch-Forsch. 149, No. 4, 196-204 (1972) (In German; English summary)
Food R.A. Abstracts 26, No. 1, Abstract No. 135, 23 (Jan. 1973)

It was found that EDTA had a markedly favourable effect on the keeping quality of fresh fish. C.S.B. Reprinted

3.239 CHANGES IN THE FLESH LIPIDS OF FISH DURING FREEZE STORAGE. III. RELATION BETWEEN RANCIDITY IN FISH FLESH AND PROTEIN EXTRACTABILITY

Takama, Kozo, Koichi Zama, and Hisanao Igarashi (Fac. Fish., Hokkaido Univ., Hakodate, Japan)
Chemical Abstracts 77, No. 15, 99745w (Oct. 9, 1972)

2.1471

To find the successful location of a set net, the swimming route of fish must be established by trial and error. The net is then set across the route. The fence net section guides the fish away from the shore into the fish trap. Fish swimming in one direction are caught in this manner, but nets can be set to trap fish swimming in two directions.

To obtain fish from the trap, it is raised to capture the fish. Then they are lifted out of the net into applicable vessels.

The advantages of the set net are as follows: (1) They are less expensive to purchase and maintain than a fishing boat; (2) part-time or full-time local labor is required, and they do not need to be housed or fed as in a boat; (3) undersized or unwanted fish are not killed as by trawling; and (4) the net is stationary; thus, it is always fishing.

The commercial size set net would have a fence net extending 1,000 yds. from shore and would have 12-in. mesh. The fish trap would be 15 fathoms deep, 250 yds. long, 50 yds. wide and the net would be made of 5-in. mesh. The daily catch is expected to be equal to that of a 50-ft. trawler.
[2 photographs, 1 diagram] SW

3.19 (1.85)

the landing and subsequent handling of the shrimp, particularly in the hand peeling operation. The use of shrimp peeling machines would be a great help to the industry.

The use of irradiation to prolong the storage life of shrimp was considered. The technique of radurization, or radiation pasteurization, was found to be the process most applicable to shrimp. Radioisotopes which emit gamma rays and are useful in irradiation of shrimp were found to be Co^{60} and Cs^{137}. In commercial operation a system must be organized where there is an irradiation room in which the source of gamma rays is located; the conveyor system for transporting the product into, through, and out of the irradiation room; biological shielding to prevent injury to personnel; and safety and control systems.

The initial quality of the product must be high, before irradiation, to ensure good storage qualities. In addition, pretreatment, such as blanching or cooking, the packing (with or without vacuum), and the storage temperature are factors affecting the storage life of the product.

The studies showed that the shelf life of shrimp can be extended substantially by irradiation, and the costs are not high. Psychological factors relative to product acceptability may require further study.
[29 figures, 57 tables, 94 references] SW

3.2340 (8.8) FLESH pH, COLOR, THAW DRIP, AND MINERAL CONCENTRATION OF PACIFIC HALIBUT (HIPPOGLOSSUS STENOLEPIS) AND CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) FROZEN AT SEA

Botta, J. R., J. F. Richards (Dept. of Food Science, University of British Columbia, Vancouver, British Columbia, Canada), and N. Tomlinson (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, B.C.)
Journal of the Fisheries Research Board of Canada 30, No. 1, 71-77 (Jan. 1973)

The first report on this overall research project was published on pages 63-69 of the same issue of this journal. It dealt with the thiobarbituric acid value, total long-chain free fatty acids, and flavor of Pacific halibut and chinook salmon brine-frozen and plate-frozen at sea. The present study was concerned with the effects of brine-freezing and plate-freezing at sea on flesh pH, color (Hunter a/b ratio), thaw drip, and mineral concentration in the fish (glazed and packaged in polyethylene) stored at -30° C. The brine-frozen fish were frozen in 13% NaCl solution.

The difference in the pH of the flesh of brine-frozen and plate-frozen samples of the halibut and the salmon were not significant; the pH generally declined during storage of the fish.

The changes in the Hunter a/b ratio of the salmon samples were similar for the brine-frozen and the plate-frozen fish, and the ratio generally increased during storage of the fish. The degree of oxidative rancidity was not sufficient to induce measurable fading of pigment.

The thaw drip of the brine-frozen samples of Pacific halibut and chinook salmon stored 9-31 weeks was less than that for the plate-frozen samples; however,

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3.2340 (8.8) FLESH CONCENTRATION OF VARIOUS LONG-CHAIN FREE FATTY ACIDS OF PACIFIC HALIBUT (HIPPOGLOSSUS STENOLEPIS) AND CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) FROZEN AT SEA

Botta, J. R., and J. F. Richards (Dept. of Food Science, University of British Columbia, Vancouver, British Columbia, Canada), and N. Tomlinson (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, B.C.)
Journal of the Fisheries Research Board of Canada 30, No. 1, 79-82 (Jan. 1973)

The first two reports on this overall research project were published on pages 63-69 and 79-82 of the same issue of this journal. They dealt with thiobarbituric acid value, total long-chain free fatty acids, flavor, flesh pH, color, thaw drip, and mineral concentration of Pacific halibut and chinook salmon frozen at sea. The present study examined changes in the concentration of individual long-chain free fatty acids and their relationship to flavor differences in the brine-frozen and plate-frozen halibut and chinook salmon frozen at sea and stored 9-81 weeks at -30° C. The brine-frozen fish were frozen in 13% NaCl solution. The frozen samples were glazed and packed in polyethylene bags before storage. The concentrations of long-chain free fatty acids were determined by use of gas chromatography. Samples of flesh from the inside muscle and the outside muscle were examined.

For both species of fish, the level of individual free fatty acids was greater in outside muscle than in the inside muscle. Few differences existed in the concentrations of free fatty acids between the plate-frozen and the brine-frozen samples. The level of many free fatty acids increased during frozen storage of the fish. The increase, in both species of fish, was most rapid during

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3.2495 PARAMETERS OF TEXTURAL CHANGE IN FROZEN-STORED COOKED LOBSTER (HOMARUS AMERICANUS) TAIL MUSCLE

Dagbjartsson, Bjorn, and Myron Solberg (Dept. of Food Science, College of Agriculture & Environmental Science, Rutgers State University, New Brunswick, NJ 08903)
Journal of Food Science 38, No. 2, 242-245 (Feb. 1973)

During frozen storage, changes occur in muscle tissue of mammals and crustaceans which cause toughening. Molecular aggregation and crosslinking of protein chains, or combinations of fatty acids with myofibrillar proteins, or releases of protein insolubilizing enzymes have been suggested as mechanisms causing toughness in the tissues.

A study was performed to evaluate the factors which may be the cause of textural changes in precooked lobster meat during frozen storage. Tail muscles, removed from lobsters boiled in 2.5% NaCl brine at 80°-85° C. for 10 min. and cooled in running water, were sealed in plastic film, quick frozen, and stored at either -12° or -27° C. The muscle tissue was tested, at intervals of several weeks up to a storage time of 50 weeks, for the following characteristics: (1) shear force; (2) pH; (3) water holding capacity (WHC); (4) amount of free sulfhydryl, salt soluble protein, actomyosin free extract, and total extractable protein; (5) shear force relative to pH; and (6) shear force relative to WHC.

The results indicated that the force required to shear the muscle increased with time of storage at either -12° or -27° C. Further, the pH increased slightly with time, and was slightly higher at -12° C. than at -27° C. storage. At -12° C.

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3.27 (3.23) THAWING OF FISH AND FISHERY PRODUCTS

Howing, H. [Houwing]
De Visserijwereld 31, No. 20, 3 pp. (1972) (In Dutch)
World Fisheries Abstracts 23, No. 4, Abstract No. 23-4393, 39-40 (Oct.-Dec. 1972)

In the article are not only advantages and disadvantages of different thawing methods mentioned but also thawing experiments with the A.P.V. vacuum thawing apparatus. This apparatus has been developed in the United Kingdom.

Thawing takes place in a steam-atmosphere at a temperature of about 20° C (68° F). With thawing experiments with herring it has been proved that the herring fats were not odixized. Moreover, the texture of the marinated herring, manufactured of vacuum-thawed herring, was better than those made from brine-thawed herring.

The quality of vacuum-thawed shrimps was very good. The bacterial counts of the shrimps thawed up according to different systems were as follows:

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3.2340 (8.8)

the first 26-45 weeks of storage (-30° C.). The occurrence of flavor differences was not related to the level of individual free fatty acids. FTP
[1 table, 16 references]

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Film is described.

A method for vacuum packaging deep frozen fish fillet blocks in

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3.2343 A METHOD OF PRODUCTION OF DEEP FROZEN FISH FILLET
(3.282)

Fr.onor Norsk Frossenfisk A/L, Norway (pat.)
British Patent 1,296,621
Food R.A. Abstracts 29, No. 1, Abstract No. 315, 48 (Jan. 1973)

after this storage period, the brine-frozen samples had approximately equal (or greater) thaw drip to that of the plate-frozen fish. With the exception of the plate-frozen Pacific halibut the thaw drip tended to increase with length of storage of the fish.

The method of freezing (brine or plate) of the halibut and salmon did not significantly affect the potassium level of the fish. For both species of fish, the sodium and chloride levels of the outside muscle of the brine-frozen fish were at least two to three times greater than that of brine-frozen inside muscle or plate-frozen muscle.
[6 figures, 4 tables, 19 references] FTP

3.27 (3.23)

Thawing method	Bacterial count frozen shrimps	Bacterial count thawed shrimps	
		Outside	Centre
Vacuum thawing	1.3×10^5	1.3×10^5	1.3×10^5
Water thawing	1.3×10^5	6.5×10^5	1.3×10^5
Air thawing	1.3×10^5	1.3×10^5	1.3×10^5

Water thawing of frozen shrimp is not only a wrong method because of the higher bacterial count but also because the flavouring compounds are leached out.

Although air thawing is a rather good method from a bacteriological point of view it has the disadvantage of the long thawing time (10 hours) whereas vacuum thawing only takes two hours with the same block dimensions.
Abstracter: H. Houwing

3.25 DO'S AND DON'TS OF REFRIGERATED VEHICLES

Gerrard, F.
Meat Trades J. No. 4399, pp. 14-15 (1972)
BFMRA Abstracts 25, No. 12, Abstract No. 4458, 543 (Dec. 1972)

The standards laid down by the American Forces for the cooling of meat which is supplied to them, by the Northern Ireland authorities for the cooling and transportation of meat, and by the West German authorities for the cooling of meat are briefly outlined. The recommendations of the International Institute of Refrigeration are also mentioned. The problems of insulation materials for containers and the recent MIR report which covered transportation and cooling of meat are also briefly dealt with. C.C.E.

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3.2495

the WHC dropped markedly sooner than at -27° C. Losses in WHC can be attributed to loss of structure in the muscle due to cooking, in addition to the damage caused by freezing. The moisture content remained stable during storage at -12° C. The biochemical and physicochemical characteristics of total extractable protein, salt soluble protein percent, actomyosin free extract percent, and quantity of free sulfhydryl remained relatively unchanged during 30 weeks of storage at either -12° or -27° C. The relation of shear force to pH change was linear in that both increased with time at either storage temperature. In contrast, as the WHC decreased, shear force increased with time at both storage temperatures.

The author suggests that there may be a common factor or factors which cause changes in pH, WHC, and shear force.
[6 figures, 1 table, 28 references] SW

3.4 PROTECTION OF SMOKE-DRIED FRESHWATER FISH FROM
(3.64)(3.12) INSECT DAMAGE DURING STORAGE IN ZAMBIA

Proctor, D. L. (Trop. Stored Prod. Cent., Trop. Prod. Inst., Slough/Bucks., England)
Chemical Abstracts 77, No. 17, 112625d (Oct. 23, 1972)

3.33 SOME CONSIDERATIONS ON PRESERVING SHRIMPS (CRANGON VULGARIS)

Houwing, H.
Voedingsmiddelentechnologie 3, No. 17, 24-26 (1972) (In Dutch)
World Fisheries Abstracts 23, No. 4, Abstract No. 23-4413, 41-42 (Oct.-Dec. 1972)

The landed shrimps in Holland are cooked immediately after catch. The bacterial count is reduced to 10^1 - 10^2 per gram. By the next step, i.e., cooling and rinsing in seawater, the bacterial count mounts up to 10^4 - 10^6 per gram.

The bacterial count mainly depends on the quality of the seawater. Undoubtedly, shrimp with such a high bacterial count have a rather short shelf life, even if they are kept cool aboard the ships.

Reduction of the bacterial count by pasteurization may improve the shelf life considerably. In principle shrimps can be pasteurized in two ways, i.e., a hot dip treatment, after the above-mentioned rinsing procedure, during eight seconds, or a pasteurization treatment later on. This treatment can take place either before or after packing.

Pasteurization before packing only results in a good product when it is done in thin layers. A treatment of forty seconds is sufficient and does not change the organoleptic properties. Weight-losses of about 10 per cent occur however.

Pasteurization of packed shrimp gives rather good results by immersing thin packages during five minutes in water of 80°C (176°F).

Abstracter: H. Houwing

3.64 STUDIES ON THE PROCESSING METHOD AND TASTE COMPOUNDS OF DEHYDRATED ALASKA POLLACK (I) CHANGES OF NUCLEOTIDES AND THEIR RELATED COMPOUNDS AND FREE AMINO ACID COMPOSITION OF ALASKA POLLACK DURING HOT-AIR DEHYDRATION

Lee, Eung Ho, Bong Ho Han, Yong Gun Kim, Syng Taek Yang, and Kyung Sam Kim
Bull. Pusan Fish. Coll. 12, No. 1, 25-36 (1972) [6 figures, 3 tables, 24 references]
Korean Scientific Abstracts 4, No. 5, Abstract No. 72/543, 157-158 (Oct. 1972)

Alaska pollock muscle was hot-air dried and then was stored for 3 months. During intervals of storage, the dried fish was analyzed for nucleotides and their related compounds.

The inosine and IMP levels in the defrosted [original] sample of flesh were 13.5 and 5.1 μmole/g. (dry basis); the hypoxanthine level was next highest. The flesh contained low levels of ATP, ADP, and AMP. IMP and inosine degraded rapidly during hot-air drying of the pollock flesh, while the hypoxanthine level increased about fourfold. Changes in the levels of nucleotides and their related compounds were not observed.

Taurine was 40% of the total amino-acid content of the muscle extracts followed by, in decreasing order, alanine, glycine, and glutamic acid. The levels of lysine, serine, and histidine were low; those of valine, aspartic acid, threonine, and leucine were very low. The level of total free amino acids increased by about 20% during hot-air drying of the flesh. FTP

4.13 (0.31) SEASONAL AND LOCAL VARIATIONS IN ODD-CHAIN FATTY ACID LEVELS IN NOVA SCOTIAN RAINBOW SMELT (OSMERUS MORDAX)

Addison, R. F. (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada), R. G. Ackman, and J. Hingley (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 1, 113-115 (Jan. 1973)

Earlier work by the authors showed the unusual occurrence of large amounts of odd-chain fatty acids in the lipids of rainbow smelt from Jeddore Harbour, N.S. It was suggested that this might be a seasonal variation that could be related to the migratory feeding habits of the fish. The present study examined the odd-chain fatty acid levels of the Jeddore smelt from the spring of 1969 to the summer of 1970. The odd-chain fatty acid levels showed a pronounced seasonal variation during the test period. The levels reached a maximum of 20% total fatty acids in the January-March period, and fell to a minimum of about 2% total fatty acids in summer and fall. The variation in the levels was general and occurred in all the odd-chain fatty acids. It appears that the odd-chain fatty acids originated in the diet of the smelt.
[2 figures, 1 table, 6 references] FTP

4.5 (4.60) EFFECTS OF SURFACE CONCENTRATION, METALS AND ACID SYNERGISTS ON AUTOXIDATION OF LINOLEIC ACID MONOLAYERS ON SILICA

Porter, W. L., L. A. Levasseur, and A. S. Henick (Food Laboratory, U.S. Army Natick Laboratories, Natick, MA 01760)
Lipids 7, No. 11, 699-709 (Nov. 1972)

The techniques of F. J. Honn, I. I. Bezman, and B. F. Daubert [JAOCS 28, 129 (1951)] and other workers [J. Amer. Chem. Soc. 90, 6109 (1968) and Photochem. Photobiol. 7, 665 (1968)] were used to study the autoxidation of monolayers of linoleic acid adsorbed from solution onto silica gel as a function of time and α-tocopherol and acid synergist content. The model system was intended to approximate the autoxidation of monomolecular layers of lipids on the cell surfaces of freeze-dried foods. This article reports the effects of metal ions and acid synergists (ascorbic, citric, phosphoric, and polyamino acids) on the autoxidation of linoleic acid in this model system. Gas chromatography was used to follow oxygen disappearance at 80° C.

The oxidation of linoleic acid (without added antioxidant) started at a nearly linear rate without an induction period. On acid-washed silica, about 60 min. were required for consumption of one-half mole of oxygen per mole of linoleic acid. When very small amounts of α-tocopherol were included in the layer of linoleic acid, no measurable amount of oxygen uptake in this system occurred during an induction period; the length of the induction period was about proportional to the tocopherol content. The inflection point at the beginning of the rapid oxidation was sharp, and the oxidation rate following this point was about the same as that of the untreated linoleic acid. The induction period of linoleic acid containing

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3.63 STUDIES ON THE PROCESSING METHOD AND TASTE COMPOUNDS OF DEHYDRATED ALASKA POLLACK (II) SOME METHODS FOR HOT-AIR DEHYDRATION OF ALASKA POLLACK

Lee, Eung Ho, Yong Gun Kim, Syng Taek Yang, Kyung Soon Kim, and Jae Hyung Phyun
Bull. Pusan Fish. Coll. 12, No. 1, 37-43 (1972) [5 figures, 5 tables, 2 references]
Korean Scientific Abstracts 4, No. 5, Abstract No. 72/544, 158 (Oct. 1972)

Round fish or fillets of Alaska pollock that have been hot-air dried are difficult to reconstitute. Therefore, the authors tried a new technique as follows: Chopped Alaska pollock meat was immersed for 30 min. in an alkaline solution containing 0.4% hydrogen peroxide, and then the mixture was agitated for 10 min. The foamy, emulsified meat was spread on a nylon net seated on a metal tray, allowed to drain, and then was dehydrated. A fairly good dried product that could be readily reconstituted was obtained. FTP

4.5 (4.60)

α-tocopherol was as much as 100% longer when exposed in a monolayer than when exposed in bulk form (containing the same amount of α-tocopherol). The rate of oxidation of the linoleic acid after commencement of rapid oxidation was 8 to 10 times greater in the monolayer than in the bulk form.

The iron content of the silica was reduced by 75% by acid washing. The rate of autoxidation of the linoleic acid (without α-tocopherol) adsorbed on acid washed silica was reduced by 60%; when α-tocopherol was present the length of the induction period was increased fourfold. Pretreatment of the silica by adsorption of acid synergists (ascorbic, citric, phosphoric, and ethylenediaminetetraacetic acid-EDTA) produced an effect similar to that obtained by acid washing the silica. The synergists extended the induction period in increasing order, respectively, as follows: ascorbic acid, phosphoric acid, citric acid, and ethylenediaminetetraacetic acid; the EDTA produced a 100-fold extension. The synergists probably display synergistic effects because of their ability to complex pro-oxidant catalysts (metals) and because of their acid activation of inhibitols (primary antioxidants).
[7 figures, 5 tables, 32 references] FTP

3.60 INFLUENCE OF FROZEN STATE REACTIONS ON FREEZE-DRIED FOODS

Karel, Marcus, and James M. Flink (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Agricultural and Food Chemistry 21, No. 1, 16-21 (Jan.-Feb. 1973)

The quality of freeze-dried foods may be superior to that of food processed by another means, because low drying temperatures are used, the original shape and appearance of the food is retained, and much of the original flavor is retained. Achieving these desirable qualities depends upon the maintenance of the original macroscopic, microscopic, and molecular structure of the food; low drying temperature is only practical if the rate of sublimation is substantial (even at the low temperatures and vapor pressures of ice). The porosity of the dry layer must be high, and no excessive impedance to vapor flow due to collapsing pores or capillaries should exist. The internal structure of the foods should be maintained to preserve the food's shape, texture, and appearance. The formation of microregions where flavor compounds are locked in is required to retain the flavor of the food. Freezing rate, minimum temperature during freezing, and the temperature of the frozen layer during drying affect the reactions that occur during the life of the food product. This article discusses the following aspects of freeze-dried foods: effects of freezing conditions on water binding by freeze-dried foods; effects of freezing on drying behavior; rates of chemical reactions in frozen foods; and effects of freezing and freeze-drying on retention of flavor in foods.
[8 figures, 9 tables, 33 references] FTP

4.15 (8.53) 7-METHYL-7-HEXADECENOIC ACID: ISOLATION FROM LIPIDS OF THE OCEAN SUNFISH MOLA MOLA (LINNAEUS) 1758

Ackman, R. G., L. Safe, S. N. Hooper, and M. Paradis (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia), and S. Safe (National Research Council of Canada, Atlantic Regional Laboratory, Halifax, N.S.)
Lipids 8, No. 1, 21-24 (Jan. 1973)

The pelagic ocean sunfish is unusual in that it is reputed to feed on jellyfish. In the course of a study of the marine animals originating or accumulating trans-6-hexadecenoic acid, the authors also examined the ocean sunfish. A sample of the species of fish was obtained in waters off Nova Scotia. A fatty acid comprising about several percent of the acids in the liver oil of the sunfish was isolated and characterized as 7-methyl-7-hexadecenoic acid. This acid and 7-methyl-6-hexadecenoic acid (reported earlier) are believed to be chiefly responsible for the 7-methylhexadecanoic acid found in many fatty acid mixtures of marine origin after hydrogenation. The origins and reasons for the specific accumulations in some samples of marine lipids of either or both 7-methyl-6-hexadecenoic acid and 7-methyl-7-hexadecenoic acid are obscure; however, the latter may be linked to the jellyfish forming a part of the diet of the ocean sunfish. trans-6-Hexadecenoic acid has also been found in the jellyfish.
[3 figures, 25 references] FTP

4.5 AUTOXIDATION OF FATTY ACID ESTERS IN THE PRESENCE OF A HEAVY METAL CATALYST "SALCOMINE" (CO[II]-BISSALICYLALETHYLENEDI-IMINE): I. EFFECT OF CATALYST UPON RATE OF CONSUMPTION OF OXYGEN AND DECOMPOSITION OF HYDROPEROXIDE

Jarvi, Pentti K. (University of Helsinki, Helsinki, Finland; Hormel Institute, Austin, MN 55912)
Lipids 7, No. 12, 755-761 (Dec. 1972)

Antioxidative and prooxidative effects were observed during the autoxidation of fatty acid esters in the presence of a heavy metal chelate "salcomine." The induction period becomes shorter and under certain conditions may disappear, when the level of the catalyst is decreased or when the temperature is increased. The decomposition of hydroperoxides is affected by Co(II)-bissalicylalethylenedi-imine; a first order reaction is involved with Arrhenius parameters E = 21,000 cal, and $A = 8.99 \times 10^{10}$ sec.$^{-1}$. Above 30° C., the solubility of oxygen in fatty acid esters, with and without salcomine, is the same.
[6 figures, 1 table, 41 references] FTP

4.5 AUTOXIDATION OF FATTY ACID ESTERS IN THE PRESENCE OF A HEAVY METAL CATALYST "SALCOMINE" (CO[II]-BISSALICYLALETHYLENEDI-IMINE): II. FORMATION OF A REACTION PRODUCT FROM A PEROXY RADICAL AND SALCOMINE

Jarvi, Pentti K. (University of Helsinki, Helsinki, Finland; Hormel Institute, University of Minnesota, Austin, MN 55912)
Lipids 7, No. 12, 788-792 (Dec. 1972)

The kinetics of the autoxidation and decomposition of hydroperoxides of fatty acid methyl esters with salcomine were described in an earlier report by the author [Lipids 7, No. 12, 755-761 (Dec. 1972)]. In the present study, the formation of ionic Co(II)-bissalicylalethylenedi-imine complexes of peroxy radicals of methyl esters of fatty acids was followed by use of UV spectra. Typical compounds were isolated and purified, and were analyzed for Co content. Their IR spectra were determined.

The combined effects of salcomine upon the autoxidation of fatty acid methyl esters is represented by the following scheme:

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4.92 (5.7) OBSERVATIONS ON THE ROLE OF VITAMIN E IN THE TOXICITY OF OXIDIZED FATS

Privett, O. S., and Reto Cortesi (University of Minnesota, Hormel Institute, Austin, MN 55912)
Lipids 7, No. 12, 780-787 (Dec. 1972)

It is believed that a primary function of vitamin E is its role as a biological antioxidant protecting cells from membrane damage. This study examined the relative effects of in vivo oxidation produced by diets devoid of vitamin E and the consumption of oxidized fat.

Rats (Sprague-Dawley strain) were fed from weaning on a sucrose-casein diet containing minerals and vitamins in the required amounts and supplemented with 10% of safflower oil, menhaden fish oil, hydrogenated coconut oil, or no fat. The rats of about 185 g. from the group fed 10% safflower oil had their diets changed for 4 weeks to a diet containing oxidized safflower oil or oxidized menhaden oil (the oil supplemented diets had been allowed to oxidize by exposing them to room temperature in the dark for 2 to 8 days). Also, for comparative purposes, rats were raised from weaning on similar diets devoid of vitamin E.

Rats fed oxidized fat showed loss of weight, effects on size of their organs, changes in triglyceride levels, and production of thiobarbituric acid-reacting substances in their tissues. No effect was found on the induced swelling of liver mitochondria or the susceptibility of erythrocytes to hemolysis. The animals fed vitamin E free diets showed suppressed growth; in vivo oxidation in these rats produced marked effects on the membrane properties of erythrocytes and liver mitochondria. [5 figures, 4 tables, 42 references] FTP

6.32 STUDIES ON THE COMPONENTS OF NAGA-KOMBU, LAMINARIA LONGISSIMA--II. INORGANIC ELEMENTS

Hosoda, Kiichi (Obihiro Ohtani Junior College, Hokkaido, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1405-1409 (Dec. 1972) [In Japanese; tables and abstract in English]

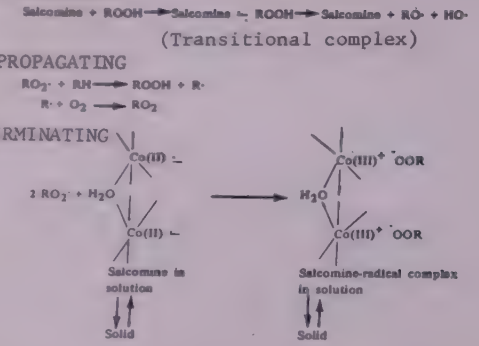
The mineral content of the dried specimens of L. longissima were determined; the data are summarized in the table that follows.

Description of dried samples of Laminaria longissima	Number of samples	Average composition, mg./100 g. on moisture-free basis			
		Calcium	Iron	Magnesium	Iodine
Sei-kombu, mature	5	890	8.03	730	349.8
Saomae-kombu, immature	5	790	17.40	620	152.7
Ascus parts of Sei-kombu	3	740	6.18	570	285.3
Parts of Sei-kombu less ascus parts	3	1070	9.04	860	372.9

[4 tables, 22 references] FTP

4.5

INITIATING



The effect may be further defined as an oxidative addition reaction.
[6 figures, 13 references] FTP

4.5 STUDIES ON THE METAL-PROTEIN COMPLEX. III. RELATIONSHIP BETWEEN THE BINDING ABILITY OF VARIOUS INORGANIC METAL-PROTEIN COMPLEX AND ACTIVITY OF METAL-CATALYZED AUTOXIDATION

Kajimoto, Gorō, and Hiromi Yoshida (Faculty of Nutrition, Kobe Gakuin University, Arise, Ikawadani, Tarumiku, Kobe, Japan)
Journal of the Japan Oil Chemists' Society 21, No. 11, 842-845 (Nov. 1972) [In Japanese; abstract in English]

This paper reports on the relation between the binding ability of inorganic metal (copper, iron, zinc, magnesium)-casein complexes and the activity of metal-catalyzed autoxidation.
[4 figures, 2 tables, 14 references] FTP

4.82 MARINE FAT. DIGESTIBILITY OF ITS FATTY ACIDS IN YOUNG CALVES

Flatlandsmo, Knut (Dep. Anim. Husb. Genet., Vet. Coll. Norway, Oslo, Norway)
Chemical Abstracts 77, No. 17, 112834w (Oct. 23, 1972)

6.54 (0.7) FURTHER STUDIES ON THE AVAILABILITY OF THE FLUORIDE IN FISH PROTEIN CONCENTRATE

Stillings, B. R., Herta R. Lagally, Elizabeth Zook, and I. Zipkin (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Journal of Nutrition 103, No. 1, 26-35 (Jan. 1973)

In a previously published study using female weanling rats, the fluoride in FPC (fish protein concentrate) was shown to be about 25 to 50% as available as that in sodium fluoride, while in a study using adult male humans the availability of fluoride from the two sources was shown to be nearly the same. The present three experiments were conducted to determine the reasons for these conflicting results. In the first experiment at high intakes of fluoride, the apparent absorption of FPC-fluoride by weanling and adult male rats was 30 to 50%, and the carcass retention was 30 to 60% as high as that of sodium fluoride. The comparative results for weanling and adult rats were similar. In the second experiment at low fluoride intakes, the apparent absorption and carcass retention of fluoride from FPC was similar to that from sodium fluoride. In the third experiment at low fluoride, calcium and phosphorus intakes, the apparent absorption and carcass retentions were higher for both sources of fluoride compared to the previous experiment. These studies showed that the availability and retention of FPC-fluoride were similar to those of sodium fluoride at low fluoride intakes. At high intakes, the availability of FPC-fluoride was less than 50% of that of sodium fluoride. Thus we conclude that the major reason for the differences in the two previously published studies was the level of fluoride intake as well as the level of calcium and phosphorus in the diets.
[1 figure, 6 tables, 12 references] Authors' abstract

5.2 CHEMISTRY OF THIAMINE DEGRADATION IN FOOD PRODUCTS AND MODEL SYSTEMS: A REVIEW

Dwivedi, Basant K., and Roy G. Arnold (Dept. of Food Science and Technology, University of Nebraska, Lincoln, NE 68503)
Journal of Agricultural and Food Chemistry 21, No. 1, 54-60 (Jan.-Feb. 1973)

This article is a review of the literature dealing with the effects of pH, heat, oxidation-reduction systems, inorganic bases (sulfites, bisulfites), thiaminases, metal complexes, radiation, and ultrasonic waves on the degradation of thiamine in food products and model systems. Also, the nature of the many compounds resulting from the degradation of thiamine is described. Actually, model systems have been mostly employed to determine the nature of thiamine degradation reactions and products. Food systems, because of their complexity, have not been used extensively in such studies.

Thiamine degradation products may contribute to the flavor of heated food systems. For example, some flavor contributing degradation products of thiamine include hydrogen sulfide, 2-methylthiophene, and 2-methylfuran. However, additional information with actual food systems is needed to assess the full significance of thiamine degradation to the flavor of food products.
[94 references] FTP

6.35 (6.31)

ECOLOGICAL STUDIES OF ECONOMIC RED ALGAE. IV. VARIATIONS OF CARRAGEENAN CONCENTRATIONS AND PROPERTIES IN CHONDRUS CRISPUS STACKHOUSE

Fuller, Stephen W. (New York Ocean Science Laboratory, Montauk, N.Y.), and Arthur C. Mathieson
Journal of Experimental Marine Biology and Ecology 10, No. 1, 49-58 (Oct. 1972)
Published by North-Holland Publishing Co., P.O. Box 211, Amsterdam, Netherlands.

C. crispus (S.) contains the economically important phycocolloid carrageenan. This sulfated polysaccharide is characterized by the following physical properties: gel strength, viscosity, and ratio of major fractions (kappa, lambda, and iota). Carrageenan is economically important because it is used extensively in the food, pharmaceutical, cosmetic, and other industries.

This study was performed to evaluate the relations between the valuable properties of Chondrus and its age, reproduction stage, habitat, and season of harvest.

No correlation was found between gel strength and viscosity. A decrease in viscosity of carrageenan was found after storage of 6 months. Storage did not influence gel strength. Age of the plants, stage of reproduction, and exposure to wave action had no effect on quantity or properties of carrageenan. Sublittoral plants had higher viscosities and concentrations of carrageenan than plants taken from littoral areas; gel strengths were higher in carrageenan from littoral plants than sublittoral plants. Carrageenan concentrations and gel strength were higher in plants taken from coastal regions than from plants in estuarine locations.

(over)

7.42 (9.19)

A SURVEY OF MERCURY RESIDUE IN FISH CAUGHT BY TAIWAN'S FISHING VESSELS

Sun, C. T. (Dept. of Food Chemistry, Food Industry Research and Development Institute, National Taiwan University), and W. H. Chang
Journal of the Fisheries Society of Taiwan 1, No. 2, 31-40 (Sept. 1972) (Taipei, Taiwan, China) [In English; abstract in Chinese]

During the period of March 1971 through February 1972, 537 fish samples from 23 different kinds (mostly swordfish and yellowfish tuna) caught by Taiwan's fishing vessels were analyzed for mercury content by means of flameless atomic absorption spectrophotometry. The dark flesh of the fish showed higher levels of mercury than did the light flesh. The mercury level in the flesh correlated directly with the size of the fish--indicating a tendency to accumulate in the body of the fish. Data are given in the table that follows.

(over)

6.54 (3.)

PILOT PLANT PRODUCTION OF AND LARGE SCALE ACCEPTANCE TRIALS WITH QUICK SALTED FISH

Del Valle, F. R. (Banco Nacional de México, S.A. Mexico City, Mexico), M. Padilla, A. Ruz, and R. Rodriguez
Journal of Food Science 38, No. 2, 246-250 (Feb. 1973)

The authors have adapted a quick salting process for fish, previously reported [Food Technology 22, 1036 (1968); and Tecnologia de Alimentos 7, No. 1, 12 (1972)], to pilot plant scale. The process consists of grinding pieces of fish flesh with simultaneous addition of salt. The ground, salted meat is pressed into cakes, and the cakes are then sun dried. The amounts of salt added are those necessary to coagulate the protein in the fish flesh, and they vary from 25 to 100% of wet weight. The pressures applied are 120 to 150 kg. per square centimeter (1,700 to 2,100 p.s.i.). The pressing step removes a large proportion of water from the mix; however, protein losses in the press liquor are negligible. In addition, before consumption, the cakes are desalted by leaching twice in boiling water; protein losses in the desalting water are also negligible. The cakes do not lose their shape when leached and they may then be cooked as desired. The product as prepared is an inexpensive, high protein, stable food that does not require refrigeration prior to use.

The pilot plant was set up in Progresso, Yucatan, Mexico, to study the raw materials that could be used including trimming parts and rejects from filleting plants and "trash" fish. The species that were used successfully were identified by the authors as follows: red gurnard (Paranthias furcifer); mojarra (Eucinostomus gula, Diapterus plumieri); grouper (Epinephelus morio); red snapper or chacchic (Aemulum espurus); and sardine (Anchoa mychilli). The cost of a pilot plant

(over)

7.597

MEASUREMENT OF FORMALDEHYDE IN FISH MUSCLE USING TCA EXTRACTION AND THE NASH REAGENT

Castell, C. H., and Barbara Smith (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 1, 91-98 (Jan. 1973)

The purpose of this study was to examine the procedure for estimation of formaldehyde in biological materials by means of trichloroacetic acid (TCA) extraction and the Nash test [T. Nash, Biochem. J. 55, 416-421 (1953)]. The Nash test is based on the formation of diacetyldihydrolutidine from acetylacetone and formaldehyde in the presence of excess ammonium salt. The authors attempted to estimate the proportion of the total formaldehyde present in fish muscle that can be recovered by TCA extraction. Measured amounts of formaldehyde were added to the sample of fish muscle, the amount of formaldehyde recovered in the TCA extract was measured, and the percentage of added formaldehyde was then calculated. A reasonably constant "recovery factor" for a given species of fish, makes it possible to convert the results of the Nash test on a TCA extract into values that more closely approximate the total amount of formaldehyde in the tissues. The average recovery from 15 different samples of cod muscle was 51.3% (standard deviation from the mean of 5.6). Inasmuch as the capacity of the muscle to bind formaldehyde is primarily determined by its chemical composition, and as the composition of the muscle varies from one species of fish to another, it seems likely that a different recovery factor may be required for each species.

(over)

6.54 (3.)

would be $11,660 of which $850 would be in raw materials and finished cakes. In this total investment $6,110 would be the cost for machinery and equipment. The design capacity was 250 kg. of dry salted cakes in 8 hr. The price per kg. of protein in fish cake was between $0.56 and $2.24 compared to milk at $5.68 per kg. of protein, cheese at $13.36 per kg., and beef at $9.04 per kg.

The recipe used in the taste trials consisted of frying three cloves of garlic and 50 g. of onion in olive oil, adding 200 g. of tomatoes and one-fourth of a sweet pepper, and frying the mixture for 10 min. A shredded, desalted fish cake was added, followed by 20 g. of "achiote" (a local condiment) suspended in the juice of a sour orange. The mixture was then allowed to simmer for 30 min., and it was served in tacos or in sandwiches. Of the adults tested, 84 to 88% liked the food prepared with fish cakes made from fillets, trimmings of filleting operations, or rejects from filleting. Almost all children tested liked the foods prepared for breakfast and lunch.

The authors believe this method for preserving high-protein, low-cost food is applicable to developing countries for feeding undernourished populations.
[2 figures, 12 tables, 3 references] SW

6.54 PROTEIN-ENRICHED CRACKER FOR COMBAT RATIONS

Audoire, P. J., P. Ramel, M. Th. Lanteaume, A. J. Le Clerc, M. Yver, and F. Dulac
(Serv. Cent. Etud. Realisations, Subsist., Paris, France)
Chemical Abstracts 77, No. 17, 112661n (Oct. 23, 1972)

7.597

Heating of fish muscle increases its ability to bind formaldehyde; therefore, the recovery factors for raw muscle are not applicable to the same muscle that has been cooked. The amount of added formaldehyde that was recovered from the fish muscle varied with variations in the procedures used in preparing the muscle, making the extract, and carrying out the test.
[4 figures, 1 table, 13 references] FTP

7.42 RAPID DETERMINATION OF SELENIUM IN FOODSTUFFS BY NEUTRON ACTIVATION ANALYSIS

Chun, S. Y.
Korean J. Sci. Technol. 4, No. 2, 61-71 (1972) (In English)
Food R.A. Abstracts 26, No. 1, Abstract No. 19, 3 (Jan. 1973)

The method used and the results obtained in determining the amount of selenium in various foodstuffs (including rice, vegetables, fruits, seafoods, dairy products and chicken) are given. Selenium content values for different foodstuffs varied between 0.07 μg/g and 3.36 μg/g. The problems involved in determining trace elements, the effect of a deficiency of selenium, the toxicity of selenium, the geographical differences in selenium content of foods, and the need for further research into the biological effects and the changes in selenium content of foods during processing and cooking are discussed. P.A.Y. Reprinted

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6.35 (6.31)

Viscosity was higher in carrageenan taken from estuarine plants than carrageenan taken from plants in coastal regions. Carrageenan concentrations, gel strength, and viscosity were greater in late fall-early winter harvests; the lowest values were found in plants harvested during spring-early summer.
[7 figures, 4 tables, 13 references] SW

6.36 INDUSTRIAL UTILIZATION OF ZOSTER

Panasyuk, V. G., V. N. Naumov, and I. M. Mogilevskii (U.S.S.R.)
Chemical Abstracts 77, No. 26, 166435k (Dec. 25, 1972)

7.42 (9.19)

Species of fish	Number of samples	Mercury content (range)	Species of fish	Number of samples	Mercury content (range)
		p.p.m.			p.p.m.
Swordfish	163	0.08-5.2	Dolphin	11	0.034-0.15
Black marlin	1	--	Grey mullet	11	0.01 -0.02
Blue marlin	10	0.56-3.28	Red snapper	12	0.19 -0.46
Sail fish	10	0.03-0.14	Spotted mackerel	11	0.028-0.074
Mako shark	5	1.1 -1.6	Frigate mackerel	7	0.020-0.15
Black finned shark	9	0.45-1.1	White pomfret	1	--
Hammer head	10	0.70-2.2	Milk fish	4	0.012-0.014
Black shark	13	0.22-0.73	Round herring	1	--
White tipped shark	4	0.40-0.58	Slipper lobster	2	0.027-0.031
School shark	21	0.10-0.44	Sand shrimp	6	0.012-0.023
Spanish mackerel	15	0.05-0.20	Blue crab	6	0.010-0.029
Yellowfin tuna	154	0.05-0.62			

[6 tables, 12 references] FTP

7.8 DETERMINATION OF FORCED DRIP FROM THE FISH MEAT TISSUE BY THE CENTRIFUGING METHOD
[OZNACZANIE WYCIEKU WYMUSZONEGO W TKANCE MIĘŚNIOWEJ RYB METODĄ WIRÓWKOWĄ]

Podeszewski, Z., and L. Drelichowski
Przemysł Spożywczy., No. 7, 269-271 (1971)
Polish Technical and Economic Abstracts NR2(86), 87 (1972) (Published by Centrum Informacji Naukowej, Technicznej i Ekonomicznej, Warszawa, Al. Niepodległości 186, Poland)

The method for determining forced drip in fish tissue is as follows: Fish tissue samples, 4 mm. thick and 10 mm. in diameter, are brought to a programmed temperature of 18° or 2° C. All subsequent procedures should be carried out under isothermal conditions. The samples must be weighed to an accuracy of 1 mg. The tissue samples are centrifuged at 3,000 r.p.m. (about 820 g) for 15 min.
[1 figure, 3 tables] FTP

7.85 (7.86) BACTERIOLOGICAL SURVEY OF THE BLUE CRAB INDUSTRY

Phillips, Fred A., and James T. Peeler (Food and Drug Administration, Washington, DC 20204)
Applied Microbiology 24, No. 6, 958-966 (Dec. 1972)

The blue crab industry stretches along the coasts of the United States from Maryland to Galveston, Tex.; the greatest concentration of the industry is in the Chesapeake Bay area. The crabs are brought to the processing plant alive and cooked immediately in boiling water or in a steam retort. Cooking in a steam retort is most common, at about 121° C., for periods ranging from 7 to 23 min. The crabs are cooled at ambient temperatures for 3 to 16 hr. Where processing plants have refrigerators the crabs are stored in them until the meat removing operation begins. Temperatures in these coolers are between 4.4 and 6.7° C. Some of the cooler temperatures were as high as 15.6° C.

During sanitation inspections of 46 crabmeat processing plants on the Atlantic and Gulf coasts, 487 samples of whole crabs after cooking, cooked crabs after cooling, crab bodies, and whole crab claws were collected. Further, 1,506 1-lb. cans of crab were collected, including 518 cans of regular meat, 487 cans of claw meat, and 501 cans of lump meat. These samples were analyzed bacteriologically. Four bacteriological count indices were used: coliforms per gram, Escherichia coli per gram, coagulase positive staphylococci per gram, and aerobic plate counts per gram.

The results indicated that crab meat from plants in Mississippi, Louisiana, and Texas had higher counts for the four indices in 19 out of 24 cases than crab
(over)

8.4 (9.10)(9.11) STRUVITE AND PREBIOTIC PHOSPHORYLATION

Handschuh, G. J., and L. E. Orgel (Salk Institute for Biological Studies, San Diego, CA 92112)
Science 179, No. 4072, 483-484 (Feb. 2, 1973)

The level of dissolved inorganic phosphate in the oceans at present ranges from 10^{-5} to 10^{-6}M. This low level is probably maintained by the insolubility of minerals of the apatite group, particularly hydroxylapatite, $Ca_5(OH)(PO_4)_3$. The compound is relatively inert and cannot readily be used as a source of phosphate for the synthesis of organic phosphates of prebiological interest.

The authors suggest, however, that struvite ($MgNH_4PO_4 \cdot 6H_2O$) rather than apatite or amorphous calcium phosphate is precipitated when phosphate is added to sea water containing more than 0.01M NH_4^+ ions. Thus, the struvite may have precipitated from evaporating sea water on the primitive earth and may have been important for prebiotic phosphorylation.
[1 table, 16 references] FTP

9.11 ON THE OCEANOGRAPHIC CONDITION FOR ALBACORE IN THE WESTERN SOUTH PACIFIC OCEAN

Ishii, Kiyohiko, and Shoji Saito (Faculty of Fisheries, Hokkaido Univ., Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1341-1349 (Dec. 1972) [In Japanese; figures, tables, and abstract in English]

Albacore are abundant in the western sea area of the Fiji Islands. Oceanographic observations were made in this area during November of the years from 1964 to 1968 to determine the reason for this abundance of albacore. The water mass was flowing from west to east. The water had a peak salinity of about 35.7 ‰ at the 200-m. depth level. The maximum hook rate for longline albacore fishing was at 200-260-m. depth level. The authors believe that the observed discontinuity of temperature and salinity of the sea structure in this area is directly related to the formation of the fishing grounds for albacore.
[9 figures, 2 tables, 14 references] FTP

7.85 (7.86)

meat from plants along the Atlantic coast and the Gulf coast of Florida. In addition, aerobic plate counts of retail crab meat from the previous day's production were higher than the counts made on the day of inspection at the processing plant. Regular crab meat had higher aerobic plate counts than claw or lump meat.

When the crab meat was processed quickly, under good sanitary conditions, the bacteriological indices were better than those from plants operating under substandard sanitary conditions. Crab meat produced under good sanitary conditions had the following bacteriological counts: coliform organisms of less than 20 per gram; no E. coli; coagulase positive staphylococci average of less than 30 per gram in 93% of the plants; and aerobic plate count average of less than 100,000 per gram in 93% of the plants, with the counts from 85% of these plants less than 50,000 per gram.

The results of the survey indicated to the authors that the processors should be able to achieve a product with good microbiological quality by applying simple rules of sanitation.

[9 tables, 10 references]

SW

7.8 PSYCHOPHYSICAL MEASURES OF TEXTURE

Moskowitz, H. R., B. Drake, and C. Akesson
J. Texture Stud. (JTXS-B) 3, No. 2, 135-145 (1972)
Food R.A. Abstracts 26, No. 1, Abstract No. 97, 17 (Jan. 1973)

Psychophysics is the correlation of sensory evaluation with physical measurements. In this review the sequence of operations required to construct meaningful scales for dimensions of perceived texture is described. (26 references) J.A.D.

Reprinted

7.81 GAS-CHROMATOGRAPHIC DETERMINATION OF VOLATILE AMINES (0.32)

Gasco, L., F. Valverde, and R. Barrera (Dr. Quím. Isot., Junta Energ. Nucl., Spain)
Chemical Abstracts 77, No. 3, 16168m (July 17, 1972)

9.11 STUDIES ON THE OSMOTIC PRESSURE OF ENVIRONMENTAL MEDIA AND BODY FLUID OF MARINE FISH--I. THE OSMOTIC PRESSURE OF THE SEA WATER ON THE MIGRATING ROUTE OF PELAGIC MARINE FISH

Hanaoka, Tasuku, and Ar Jone Chu (Dept. Fisheries, Faculty of Agr., Kyushu Univ., Hakozaki, Fukuoka, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1351-1356 (Dec. 1972)

In an attempt to obtain further understanding of the migratory behavior of pelagic marine fish, the authors determined the osmotic pressure and the temperature of the waters in which the fish were caught. These data were then correlated with the observed behavior of the fishes. The information was collected from fisheries survey vessels operating in the fishing ground areas. The authors concluded that the osmotic pressure of the sea water is closely related to the life behavior of pelagic marine fish. The fish seem to migrate in water having certain levels of osmotic pressure peculiar to each fish; the relationship may vary, also, with the maturity of the fish.

[2 figures, 11 references]

FTP

9.11 ZINC-65 IN BENTHIC INVERTEBRATES OFF THE OREGON COAST (9.19)

Carey, Andrew G., Jr. (Dep. Oceanography, Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98367n (Oct. 9, 1972)

8.8 LABORATORY QUALITY CONTROL OF THE SMOKING LIQUID IN THE SMOKED FISH INDUSTRY (3.11)

Lapshin, I. I., T. G. Rodina, and L. P. Yakushova (Mosk. Inst. Nar. Khoz. im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 17, 112618d (Oct. 23, 1972)

8.8 CONSUMER AWARENESS OF AND ATTITUDES TO FOOD TEXTURE. II. CHILDREN AND TEENAGERS

Szczesniak, A. S.
J. Texture Stud. 3, No. 2, 206-217 (1972)
Food R.A. Abstracts 26, No. 1, Abstract No. 77, 13 (Jan. 1973)

A discussion of teenagers' and childrens' attitudes to food texture is presented based on information obtained from original consumer interviews and published data relative to growth and development. Teenagers appear to have a better understanding of the concept of texture, suggesting that the texture of food may assume a greater importance with the oncoming generation of adult consumers. J.A.D.

Reprinted

9.11 COOPERATIVE GULF OF MEXICO ESTUARINE INVENTORY AND STUDY, FLORIDA: PHASE 1, AREA DESCRIPTION

McNulty, J. Kneeland, William N. Lindall, Jr. (National Marine Fisheries Service, NOAA, Gulf Coastal Fisheries Center, Biological Laboratory, St. Petersburg Beach, FL 33706), and James E. Sykes (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516)
NOAA Technical Report NMFS CIRC-368, U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Seattle, Wash. (Nov. 1972), 126 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $1.25.

Newly-developed tables and maps depict the dimensions, submerged vegetation, tidal marshes, mangrove swamps, commercial oysters beds, leased oyster-rearing areas, sources of pollution, drained tidal marshes, and filled areas of Florida's west coast estuaries. Published and unpublished information on temperature, salinity, geology, artificial fishing reefs, stream discharge, human population, commercial fishing, and economic development is presented in new form.

If the total area of estuaries (3,003,312 acres = 1,215,440 ha) is considered to be the area of open water (2,081,525 acres = 842,393 ha) plus the area of mangrove swamps (393,160 acres = 159,112 ha) and tidal marshes (528,528 acres = 213,895 ha), then roughly one-half of the total area of estuaries is unvegetated; the remaining half is about equally divided among mangroves, tidal marshes, and submerged vegetation.

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9.12 (1.34)(1.35) FOOD OF JUVENILE PINK AND CHUM SALMON IN PUGET SOUND, WASHINGTON

Gerke, Robert J. (Washington Dept. of Fisheries, Olympia, Wash.), and Victor W. Kaczynski (Dept. of Oceanography, University of Washington, Seattle, Wash.)
Technical Report No. 10, Washington Dept. of Fisheries, Olympia, Wash. (1972), 27 pp.

Pink and chum fry, after emerging from the spawning gravel, migrate immediately to salt water. These small fish (about 30 mm. in fork length) enter the estuaries in April and May. In Puget Sound the young fish can be found along shoreline areas in waters of 1 m. or less. Studies were performed to determine the kinds of organisms the young fish prey upon.

Pink and chum salmon fry were collected from three sites which were major salmon management areas and harbored good concentrations of fry. The three areas were: Anderson Island, Southern Puget Sound; Port Susan, Central Puget Sound; and Toandos Peninsula, Hood Canal. Each of the areas was sampled at 10-day intervals during April and May 1970. The stomach contents of the fry were analyzed with the aid of a microscope, and all food organisms found were placed in either of four categories: pelagic, epibenthic, benthic, and terrestrial. Epibenthic was defined as that area on or near the bottom and benthic referred to organisms living within the bottom substrate.

The stomach contents of the salmon fry varied depending on the area sampled. Fish from Anderson Island fed on harpacticoid copepods (minute crustaceans) which made up 95% of the diet. The diet of the fish from Port Susan was more varied; barnacle nauplii and mysis (shrimplike crustacean) larvae predominated in the

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9.14 NUTRITIONAL REQUIREMENTS OF THE GILTHEAD BREAM CHRYSOPHRYS AURATA. QUANTITATIVE PROTEIN REQUIREMENTS

Sabaut, J. J., and P. Luquet (Station de Recherches de Nutrition, Centre National de Recherches Zootechniques, I.N.R.A., Jouy-en-Josas, France)
Marine Biology 18, No. 1, 50-54 (Jan. 1973)

Successful aquaculture production of marine fish depends upon adding the correct quantity of protein (the most expensive item in feed) to the diet. Earlier work indicated that the gilthead bream (a candidate species for aquaculture production) required a large amount of protein in its feed. No precise data had been included in the report.

To determine the protein requirements of the gilthead bream, a series of experiments were performed with diets containing various amounts of protein. Young bream, less than 1 year old, were caught and divided into six groups and fed six semisynthetic diets for 4 months. The diets contained 11.5, 20.25, 28.06, 38.4, 53.1, and 60.8% protein, respectively, in proportion to dry feed. The diets had a casein and cornstarch base.

The intake of the fish varied with the protein content in the diet; that is, the less protein in the feed, the higher the intake. Growth increase corresponded to protein content in the diet up to 40%; weight gain of fish on diets containing 53.1 and 60.8% protein could not be differentiated from weight gain on the 40% protein diet. However, the protein efficiency ratio (the ratio of weight gain to protein intake) was higher for diets containing less protein. In addition, the protein utilization coefficient (the amount of protein retained) showed a better yield for fish receiving less protein.

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9.15 STUDIES ON THE OCCURRENCE AND BIOCHEMICAL PROPERTIES OF VIRULENT AND AVIRULENT STRAINS OF FRESHWATER FISH PATHOGEN, AEROMONAS LIQUEFACIENS

Kow, Guang-Hsiung (Dept. of Zoology, College of Science, National Taiwan University)
Journal of the Fisheries Society of Taiwan 1, No. 2, 8-13 (Sept. 1972) [In Chinese; abstract and tables in English]

Three hundred and thirty-nine strains of A. liquefaciens were isolated from eel, carp, goldfish, ayu, and fishpond water in various locations in Japan during February 1966 to July 1970. The strains were divided into three categories relative to their pathogenicity: virulent, attenuated virulent, and avirulent. One hundred and two of the 107 virulent strains were VP [Voges-Proskauer test] positive and produced gas; 3 of the 23 VP negative strains were virulent; and 1 of the 16 nongas producing strains was virulent.
[4 tables, 19 references] FTP

9.12 (1.34)(1.35)

diet in April. Gammarids, barnacle nauplii (larvae), invertebrate eggs, and harpacticoid copepods comprised most of the prey in May. The prey of young salmon from Toandos Peninsula included harpacticoid copepods, barnacle nauplii, and invertebrate eggs in April, and gammarids (tiny shrimplike bottom dwellers), euphausids (tiny crustacean), harpacticoid copepods, copepodites, and a variety of other organisms comprised the diet in May.

These results indicate that epibenthic organisms are the most important food types. These small organisms consist of crustaceans which inhibit a layer of water near the bottom in the littoral to sublittoral zone. They are shrimplike in appearance, and they move by crawling or hopping on the bottom and swimming for short distances.

The ecological zone that these organisms inhabit (shorelines and beaches) is vulnerable to alterations by land developments such as piers, jetties, land fills, marinas, bulkheads, and other shore facilities. These salt-water installations destroy habitat that supports food organisms that comprise young salmon prey.
[4 figures, 15 tables, 6 references] SW

9.16 (5.5) ESSENTIALITY OF VITAMIN C IN FEEDS FOR INTENSIVELY FED CAGED CHANNEL CATFISH

Lovell, Richard T. (Dept. of Fisheries and Allied Aquaculture, Auburn University, Auburn, AL 36830)
Journal of Nutrition 103, No. 1, 134-138 (Jan. 1973)

Sixteen hundred channel catfish fingerlings were stocked in 1-m^3 floating cages, 400 per cage, and fed production-type diets intensively for 180 days. Half of the fish were fed a diet that was nutritionally sufficient except for being low in vitamin C and the remaining fish were fed the same formulation with supplemental vitamin C. At the end of the feeding period each fish was examined for gross signs of vitamin C deficiency and fish were sampled for examination for internal symptoms by X-ray, tissue analysis, and histological techniques. Weight gains (g), feed conversions (g gain/g feed), survival (%) and incidence of physical deformation (%) for fish fed diets with and without supplemental ascorbic acid, respectively, were 531 vs. 331; 1.29 vs. 1.88; 98.0 vs. 77.8; and 3.9 vs. 45.0. Deformities were primarily scoliosis and lordosis with depigmented areas on backs. Vitamin C deficiency resulted in higher mortality from pathogenic bacteria infestation. Differences in response to the two diets did not become apparent until after the fish had grown satisfactorily for at least 12 weeks or weighed 100 to 180 g. Dietary supplementation of vitamin C was reflected in blood, liver and anterior kidney contents of ascorbic acid but not in condition of gill filaments or opercula.
[2 figures, 3 tables, 15 references] Author's abstract

9.11

Human population in coastal counties increased from 614,616 persons in 1930 to 3,320,226 persons in 1970, resulting in adverse effects from pollution to 43 percent of estuarine areas, filling of 23,521 acres (9,519 ha) mainly for residential and industrial development, and draining of 26,676 acres (10,796 ha) of tidal marshes for mosquito control. Increasing population correlates directly with the number of sources of pollution, filled area, and the area closed to shellfishing by public health authorities; thus, failure to control the adverse effects of population growth will clearly result in continued rapid degradation of estuarine habitat on Florida's west coast.
[46 figures, 11 tables, 168 references] Authors' abstract

9.14

The authors concluded that 40% protein in the diet may be considered the minimum for optimum growth of gilthead bream. This percentage is similar to the requirements of chinook salmon, rainbow trout, sockeye salmon, catfish, and carp reported in other work.
[1 figure, 4 tables, 23 references] SW

9.11 SEASONAL AND AREAL DISTRIBUTION OF RADIONUCLIDES IN THE BIOTA OF THE COLUMBIA RIVER ESTUARY (9.19)

Renfro, William C., William O. Forster, and Charles Osterberg (Dep. Oceanography, Oregon State University, Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98393t (Oct. 9, 1972)

9.14 AMINO ACIDS ESSENTIAL FOR THE GROWTH OF EELS, ANGUILLA ANGUILLA AND ANGUILLA JAPONICA

Arai, Shigeru, Takeshi Nose, and Yoshiro Hashimoto (Freshwater Fish. Res. Lab., Hino, Japan)
Chemical Abstracts 77, No. 17, 112804m (Oct. 23, 1972)

9.16
(1.9)

AN EVALUATION OF STRIPED BASS FINGERLING CULTURE

Humphries, Earl T., and Kenneth B. Cumming (Bureau of Sport Fisheries and Wildlife, Virginia Cooperative Fishery Unit, Virginia Polytechnic Institute, Blacksburg, VA 24061)
Transactions of the American Fisheries Society 102, No. 1, 13-20 (Jan. 1973)

The establishment of a self-propagating population of striped bass in landlocked water has not succeeded. The techniques for propagating and transporting fry have been developed, but stocking fry has not succeeded because of high mortality. The stocking of adults in spawning condition to establish the fish in inland waters also failed.

The requirement of striped bass reproduction is that the eggs remain suspended in a current until hatched; otherwise, the eggs settle to the bottom and suffocate. Most reservoirs where populations of striped bass are established do not provide the required condition for hatching of the eggs. Hatcheries were established to provide fish for stocking the reservoirs. In observations made on female adults, those with immature eggs could be induced to ovulate with hormones, but the eggs would not hatch. In addition, for eggs to produce viable fry, the eggs had to be taken within an hour of ovulation. In 1964, fry were stocked in an earthen pond, which was fertilized to produce a heavy zooplankton bloom, to determine if fry could be reared to fingerlings in this manner. About
(over)

9.17
(2.1126)

VARIATIONS IN CATCHABILITY OF FISHES WITH COLOR OF GILLNETS

Jester, Douglas B. (Dept. of Animal, Range and Wildlife Sciences, New Mexico State University, Las Cruces, NM 88003)
Transactions of the American Fisheries Society 102, No. 1, 109-115 (Jan. 1973)

An inherent objective in the activities of fishery research fish population control, and commercial fishing, is to catch more fish per unit effort and to catch species or sizes more selectively. Colored gill nets were tested in a large reservoir on the Rio Grande River in southwestern New Mexico, to determine if they could increase efficiency and selectivity of catch rates in comparison to white nets.

The results indicate that the colored nets caused positive or negative selectivity for various species. Most important differences consisted of reduced catches in colored nets. The use of colors allowed selection of species with fewer unwanted fish. Compared to white nets, more catostomids (suckers and buffalo fish) and carp and fewer game fish were caught in brown nets. Six species of sunfishes were caught at higher rates in orange nets than in any other color, and largemouth bass were taken selectively in yellow nets. Brown nets offered advantages for commercial fishing and fish control efforts.
[5 tables, 10 references]

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9.16

WATER LEVELS, FLUCTUATION, AND MINIMUM POOLS IN RESERVOIRS FOR FISH AND OTHER AQUATIC RESOURCES - AN ANNOTATED BIBLIOGRAPHY

Fraser, J. C. (Environment Protection Authority, Victoria, Australia)
FAO Fisheries Technical Paper No. 113, Food and Agricultural Organization of the United Nations, Rome, Italy (Nov. 1972), 42 pp. (Distribution restricted)

This bibliography is for engineers and fishery biologists who are engaged in the planning and operation of reservoirs on inland waters of the world; it provides them with a list of readily available literature dealing with the effects of fluctuating levels and of pool levels on fish and other aquatic resources. This collection of references, abstracts, and notes was accumulated over a short period of time and is not a complete survey of all the available literature.

Demands for water have led to increased storage or retardation of runoff through impoundment--either in natural lakes where the level has been raised by dams or by the construction of reservoirs, or manmade lakes. In such impoundments the water levels must of necessity rise and fall. In some natural lakes that have been impounded the original natural water level may have been raised, but in others the water level may also be lowered well below its natural level. In manmade lakes, there may be severe seasonal fluctuations of water levels, or even complete drainage in years of low runoff and heavy downstream demands for water.

Harmful effects on fish and other aquatic resources may result from the rise and fall of water levels in reservoirs. The food components may be altered in volume, availability, and composition. Spawning of the fish may be disturbed or
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(1.81)

STUDIES ON SUSPENDED CULTURE OF OYSTER CRASSOSTREA GIGAS IN THE KOREAN COASTAL WATERS. (1) ON THE GROWTH RATE OF OYSTER IN GROWING AREA

Bae, Gyung Man, and Pyung Arm Bae
Bulletin of the Fisheries Research & Development Agency No. 9, 71-84 (July 1972) (Pusan, Korea) [In Korean; abstract, figures, and tables in English]

The growth of oysters was examined during their culture in the Bay of Yun-Goo-Ree, Ko-Je Island, off southern Korea from January to December 1970. The raft hanging method of culture was used. The oysters grew faster near the surface of the water than at the middepth, or near the bottom. The oysters grew faster at the higher water temperatures, during June and July when the water temperature ranged from 18.0° to 26.6° C.
[9 figures, 5 tables, 6 references]

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prevented, and fish eggs and fry may be killed. Permanent growth of useful aquatic vegetation may be inhibited. Fish may die from lack of space, increased turbidity, or change in chemical conditions.

However, benefits may accrue through fluctuations in water levels. A reduction of water levels immediately following deposition of eggs may permit the control of predators or competing species of fish. Flooding of lake margins during the spawning seasons may aid the reproduction of other wanted species or increase the water's productivity. Complete drainage of a reservoir and then refilling and restocking may increase fish production.

Each reservoir is an entity in itself, and it is not possible to generalize on the effects caused by water level fluctuations. The bibliography, then, should be helpful to those seeking useful information on the subject.

[Abstract of the Foreword prepared by William A. Dill] FTP

9.16 SHELL STRINGER APPARATUS

Austin, George E.; assignor to Richard F. Rawlings, 226 SW 131st St., Seattle, WA 98146 (pat.)
U.S. Patent Reissued 27,577 (Feb. 6, 1973)

This patent is for a shell stringing device which punches a hole in each oyster shell and strings the shells onto a wire. FTP

9.16 (1.9)

30,000 fingerlings were reared, and the results were considered a breakthrough. Newly hatched fry are especially vulnerable to predation. The practice of holding them in troughs until they are swimming strongly and actively feeding reduces their vulnerability to predation after they are transferred to ponds. Sensitivity to handling, or abrupt contact with light or loud noises, may induce shock in the larvae which usually causes death. The following table is a summary of the best conditions for rearing striped bass larvae. Further research in nutrition of fry is required before large-scale rearing to fingerling size can be undertaken.

Factor	Range	
	Lower	Upper
Temperature (°C.)	16.0	19.0
Dissolved oxygen (p.p.m.)	5.0	--
pH	7.5	7.9
Sulfates (p.p.m.)	--	200.0
Chlorides (p.p.m.)	--	950.0
Dissolved solids (p.p.m.)	100.0	900.0

[1 figure, 1 table, 29 references] SW

9.16 (1.81) STUDY ON SPAT COLLECTION OF OYSTER (CRASSOSTREA GIGAS THUNBERG)

Bae, Gyung Man, and Pyung Arm Bae
Bulletin of Fisheries Research & Development Agency No. 9, 47-54 (July 1972) (Pusan, Korea) [In Korean; abstract, figures, and table in English]

This work concerned the collection of seed oysters and involved an attempt to determine the spat fall and spawning season in the Bay of Chinhae and Bay of Haechang, southern Korean coast. The work was carried out from June 20 to Oct. 30, 1970.

The development period for oyster larvae is about 16 days when falled as spat sets in the Bay of Chinhae (water temperature of 28° C. and specific gravity 1.016); it was about 18 days in the Bay of Haechang (water temperature of 25.1° C. and specific gravity of 1.022). The best period for spat fall was the end of September in the Bay of Chinhae and the beginning of August in the Bay of Haechang. Spawning of the oysters was induced by a sudden change in water temperature and specific gravity. The average temperatures of the water during the spawning seasons were 24.1° and 22.1° C. in the Bay of Chinhae, and 23.2° and 25.2° C. in the Bay of Haechang.

[6 figures, 1 table, 12 references] FTP

9.17 APPLICATION OF THEORY AND RESEARCH TO FRESHWATER AND MARINE FISHERIES MANAGEMENT

Coble, Daniel W. (editor) (Wisconsin Cooperative Fishery Unit, University of Wisconsin, Stevens Point, WI 54481)
Transactions of the American Fisheries Society 102, No. 1, 155 (Jan. 1973)

The following articles were presented at the 101st Annual Meeting of the American Fisheries Society held in Salt Lake City, Utah, September 15-18, 1971. Because they were so well received at the meeting, the papers were published in this journal for the benefit of the wider audience that did not attend the meeting.

"Application of Theory and Research in Fishery Management of the Laurentian Great Lakes," by Stanford H. Smith, pp. 156-163. [1 table, 1 figure, 22 references]

"Application of Theory and Research to Management of Warmwater Fish Populations," by Robert O. Anderson, pp. 164-171. [5 figures, 2 tables, 22 references]

"Application of Research to the Management of British Columbia Sockeye Salmon," by K. Radway Allen, pp. 172-177. [19 references]

"The California Sardine--Anchovy Fisheries," by G. B. Talbot, pp. 178-187. [2 figures, 1 table, 31 references]

"Application of Theory and Research in Freshwater and Marine Fisheries Management Programs--A Discussion of the Papers Given by S. H. Smith, R. O. Anderson, K. R. Allen, and G. B. Talbot," by Richard H. Stroud, pp. 188-193. [2 references]

"Application of Theory and Research in Freshwater and Marine Fisheries Management Programs--A Discussion of the Papers Given by S. H. Smith, R. O. Anderson, K. R. Allen, and G. B. Talbot," by John J. Magnuson, pp. 194-195.

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9.17 EXOTIC AQUATIC ORGANISMS IN FLORIDA WITH EMPHASIS ON FISHES: A REVIEW AND RECOMMENDATIONS

Courtenay, Walter R., Jr. (Dept. of Biological Sciences, Florida Atlantic University, Boca Raton, FL 33432), and C. Richard Robins
Transactions of the American Fisheries Society 102, No. 1, 1-12 (Jan. 1973)

Tropical aquarium fish importers and amateur aquarists have been found to be responsible for the introduction of some of the fishes and plants not native to Florida and the United States. There have also been purposeful introductions of fish for sport, food, aquarium resources, or for biological control of pests. These introductions are often made without adequate information on the possible consequences. Biological control of aquatic weeds--some of which were introduced with a aquarium fish importation--led to the introduction of the blue tilapia by the Florida Game and Fresh Water Fish Commission in 1961. This fish now is established in 10 counties of the state; and the streams where it is abundant are devoid of most vegetation and nearly all native fishes. Other incidents with similar ecological damage have occurred in the state.

A potential hazard to public health is the water that accompanies imported fishes. There is the possibility that infected snails which are the intermediate host for the disease caused by Bilharzia could be released to Florida waters from the transport water of fish imported from Africa; the disease is endemic to large parts of Africa.

The following steps should be taken as a minimum precaution to prevent imports hazardous to the ecology: (1) reasons for proposing the introduction of a

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9.19 MARINE POLLUTION AND SEA LIFE

Ruivo, Mario (General editor)
Fishing News (Books) Ltd., 23 Rosemount Ave., West Byfleet, Surrey, England (1972), 624 pp. Price £17.75, postage 30p. [Articles are in English, French, or Spanish; abstracts are in the two languages different from the article.]

For those who are interested in or working on the problems of pollution, this book can be a source and guide. Two hundred and eight authors have contributed 231 articles with a bibliography for each. The contributions were originally given at the FAO Technical Conference on, "Marine Pollution and Its Effects on Living Resources and Fishing," held in Rome, Italy, December 9-18, 1970. The articles have been gathered into seven major sections.

In the first section, "Marine Pollution in the World Today," the condition of coastal European and North American waters is described extensively. There are also reports on conditions off Japan, the Philippines, Hong Kong and Singapore, Australia, and Peru.

In the second section, "Behaviour and Fate of Pollutants in the Marine Environment," the articles deal with the physical, chemical, and biological processes naturally available to influence various pollutants. The capability of these processes to inactivate pollutants is not completely known. Simulation and hydrodynamical numerical models could be helpful in predicting such capability.

The third section, "Effects of Pollutants on the Biology and Life Cycle of Marine Organisms," comprises reports on experiments that show the necessity of establishing standard methodology for determining the long-term effects of pollutants.

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9.19 BIOLOGICAL ASPECTS OF THEMAL [sic] POLLUTION.
II. SCIENTIFIC BASIS FOR WATER TEMPERATURE STANDARDS AT POWER PLANTS

Coutant, C. C. (Environmental Sciences Div., Oak Ridge National Laboratory, Oak Ridge, Tenn.)
Critical Reviews in Environmental Control 3, No. 1, 1-24 (Aug. 1972)

In a previous report the author reviewed the questions regarding thermal discharges from electricity-generating plants. In this second report the author reviewed the subject relative to the sources of potential ecological damage. In defining thermal requirements of aquatic species a set of criteria must be developed. These criteria are related to the water temperature that a species will tolerate in each of its life stages (egg, larva, adult). Complex diagrams are presented which combine time with temperatures tolerated, acclimation temperatures, temperature ranges for spawning, growth, and mortality. By means of these diagrams, the effects of the high and low temperatures of the plant's effluents can be predicted for a species. A list of species with bibliographical references to upper and lower temperature extremes that can be resisted is presented.

The makeup of aquatic communities may be altered as a result of temperature changes, and the change may be in the form of increased nuisance organisms such as clumping algae. The planning of the cooling system effluent should be to prevent buildup of nuisance organisms and maintain the population level of a desirable ecological community.

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9.19 (1.81) EFFECTS OF THE POLYCHLORINATED BIPHENYL AROCLOR 1254 ON THE AMERICAN OYSTER CRASSOSTREA VIRGINICA

Lowe, J. I., P. R. Parrish, J. M. Patrick, Jr., and J. Foster (Environmental Protection Agency, Sabine Island, Gulf Breeze, FL 32561)
Marine Biology 17, No. 3, 209-214 (Dec. 1972)

The presence of polychlorinated biphenyls (PCBs) in the marine environment has been widely reported. One PCB, Aroclor 1254, was found in oysters in a local estuary of Escambia Bay, Fla. The presence of the PCB was also found to be widespread in the waters, sediment, and fauna of the bay. Oysters exposed for 96 hr. to concentrations of 10 p.p.b. or more of this PCB were found to have decreased shell growth.

Experiments to determine effects of long-term exposure to Aroclor 1254 were performed. Oysters were grown from spat to adults in flowing sea water containing either 5 p.p.b. of the PCB (for 24 weeks) or 1 p.p.b. (for 30 weeks). The oysters were cleaned, weighed, and measured at 2-week intervals. The growth rate (size and weight) of the oysters exposed to 5 p.p.b. of Aroclor 1254 was reduced in comparison to the growth rate of control oysters grown in the absence of PCB. Growth rate of oysters grown in water containing 1 p.p.b. Aroclor 1254 was unaffected. The residue retained in the oysters grown in 5 p.p.b. of Aroclor 1254 amounted to 425 p.p.m. of the blended oyster tissue. This concentration was 85,000 times that of the PCB in the water; after 28 weeks depuration in PCB-free water these oysters retained less than 0.3 p.p.m. of PCB. Oysters exposed to 1 p.p.b. of Aroclor 1254 showed 101 p.p.m. of PCB in the blended tissue; a concentration 101,000 times more than the PCB in the water. Less than 0.2 p.p.m.

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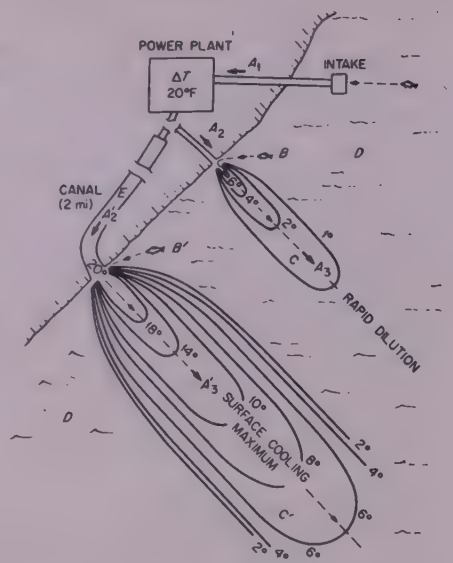
An example of an electric power station using lake water for cooling is shown in the figure. There are alternative discharges shown. Warm condenser water can be discharged into the lake at high-flow velocity or through a canal channeling a slow flow.

An analysis of the potential damage to organisms in the important thermal areas is presented.
[6 figures, 2 tables, 104 references]



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of PCB was retained in the tissue after 12 weeks' depuration. Examination for histopathology in oysters exposed to 5 p.p.b. PCB showed, at the end of the exposure period, atrophy of digestive diverticular epithelium and degeneration of vesicular connective tissues with leukocyte infiltration. These tissues did not appear to be pathological in oysters examined after 12 weeks of depuration. This observation indicated that the tissue recovered after depuration.

Oysters are not susceptible to PCB poisoning as are marine crustaceans and fish. The high concentration of PCB in tissue could prevent oysters from being marketed in the event of accidental exposure to PCB.
[4 figures, 1 table, 10 references]

SW

Foulds, Jon Marquis (Buck Seifert and Jost, Morrisville, Pa.)
Chemical Abstracts 77, No. 24, 156066b (Dec. 11, 1972)

9.19 WHAT'S IT ALL ABOUT?
(6.3)

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fish should be given and demonstrated, (2) a search for optional species should be made, (3) a preliminary assessment of impact should be made, (4) the subject should be made public for review, (5) research and experiments should be performed to test the impact of the proposed addition on the environment, and (7) with favorable information the imported organism should be released to the environment. [1 table, 22 references]

SW

Totterman, Harald (Dep. Water Air Improv., Finn. Pulp Pap. Res. Inst., Helsinki, Finland)
Chemical Abstracts 78, No. 6, 33560w (Feb. 12, 1973)

9.19 OXYGEN-CONSUMING ORGANIC MATTER (BOD) IN EFFLUENTS ORIGINATING IN DIFFERENT PULPING PROCESSES OF THE WOODWORKING INDUSTRY. REVIEW OF LITERATURE DURING THE YEARS 1960-1970

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In section 4, "Ecosystem Modifications and Effects on Marine Communities," the articles contain descriptions of the effects of pollutants on communities such as coral reefs, plankton, littoral colonies, and the ecology found adjacent to urban settings.

The fifth section, "Technical Aspects of Minimising Pollution and Countering Its Effects," contains articles on pollution abatement, monitoring pollution, treatment of pollution, and constructive use of pollution.

Section 6, "Effects of Pollutants on Quality of Marine Products and Effects on Fishing," deals with detrimental action of bacterial, taste, odor, and toxigenic pollutants on marine sources of food and food products.

Articles in section 7, "Scientific Basis for International Legislative Control of Marine Pollution in the Interests of Marine Resources and Fisheries," describe the need for advice from the community of scientists in the establishment of international regulations for conservation of marine resources and control of pollution.

SW

Rasmussen, Reinhold A. (Washington State Univ., Pullman, Wash.)
Chemical Abstracts 77, No. 18, 117751b (Oct. 30, 1972)

9.19 WHAT DO THE HYDROCARBONS FROM TREES CONTRIBUTE TO AIR POLLUTION?

9.19 (1.92) THE UPTAKE AND PERSISTENCE OF CARBARYL IN CHANNEL CATFISH

Korn, Sidney (U.S. Bureau of Sport Fisheries and Wildlife, Fish-Pesticide Research Laboratory, Columbia, MO 65201)
Transactions of the American Fisheries Society 102, No. 1, 137-139 (Jan. 1973)

[The persistent organochlorine insecticides such as DDT are being replaced with equally active but less persistent insecticides which are classed with a group of chemicals called carbamates. Carbaryl, known also as Arylam and Sevin, is one of these insecticides. Abstractor's note]

The formula of carbaryl is 1-naphthyl-N-methyl carbamate. Because insecticides applied to crops appear in aquatic environments through drainage of surface runoff or are carried directly to streams by air currents, experiments were performed to determine uptake, storage, and rates of excretion of carbaryl in fish.

Channel catfish were exposed to radioisotopic carbaryl ^{14}C and nonlabeled carbaryl in environmental water or mixed in the diet for 56 days: 0.05 mg. per liter (low) or 0.25 mg. per liter (high) in the water and 0.28 mg. per kilogram (low or 2.8 mg. per kilogram (high) per week mixed in pelleted feed.

No fish mortalities occurred. The mean total residues of labeled carbaryl and its metabolites accumulated by the fish on the high diet was 9 ng. per gram. Residue accumulated after exposure to the high concentration in water was 11 ng. per gram. The residues in low-treatment groups in diet and water were 1 and 2 ng. per gram, respectively. Fish exposed to the high diet eliminated residues rapidly after feeding on the carbaryl free diet for 28 days; they retained

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9.19 (7.9) ANALYSIS OF POLYCHLORINATED BIPHENYLS BY GAS CHROMATOGRAPHY AND ULTRAVIOLET IRRADIATION

Hannan, Ellen J., Donald D. Bills, and Jeffry L. Herring (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Agricultural and Food Chemistry 21, No. 1, 87-90 (Jan.-Feb. 1973)

Due to the similarity of the polychlorinated biphenyls (PCBs) to DDT, they are carried through the analytical cleanup methods normally used for chlorinated insecticides and give similar response using gas chromatography-electron capture analysis. As a result, the PCBs have often been mistaken for the chlorinated insecticides, especially DDT and DDE. In this study, an ultraviolet method for the identification of certain chlorinated insecticides [W. M. Kaufman, D. D. Bills, and E. J. Hannan, J. Agr. Food Chem. 20, No. 3, 628 (1972)] was used to identify the PCBs alone and in the presence of chlorinated insecticides. By this method, the component was trapped as it eluted from the gas chromatograph, exposing it to laboratory ultraviolet light, and then rechromatographing the resulting products. The degradation pattern of the PCB peak usually differed from the degradation pattern of the chlorinated insecticide having the same retention time. To note any interferences or changes that might occur when chlorinated insecticides and PCBs are present together, a mixture of the chemicals was trapped, irradiated, and rechromatographed. The method was used to analyze samples of herring and salmon oils.

[5 figures, 3 tables, 13 references] FTP

9.19 ENDRIN TOXICOSIS IN RAINBOW TROUT (SALMO GAIRDNERI)

Grant, Blake F., and Paul M. Mehrle (Fish-Pesticide Research Laboratory, Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Columbia, MO 65201)
Journal of the Fisheries Research Board of Canada 30, No. 1, 31-40 (Jan. 1973)

The purpose of this study was to determine dietary intakes of endrin resulting in disturbances in growth rate, osmoregulation, and intermediary metabolism. To detect disturbances more readily, the ability of endrin-exposed fish to adjust to moderate physiologic demands of a "loading" stress as may occur in nature was evaluated. The test fish were exposed to forced swimming. The fish were fed dietary levels of 0.215, 0.725, 2.15, and 7.25 p.p.m. (4.3, 14.5, 43, and 145 µg. of endrin per kilogram of body weight per day) for 163 days, and then they were forced to swim for 1 hr. Feeding the endrin to trout affected their serum electrolytes, osmolality, total protein, cholesterol, cortisol, lactate, glucose, liver glycogen, and growth. Forced swimming, alone, affected 9 of the 16 serum parameters tested. Increases in serum Na and Cl and significant increases in osmolality and liver glycogen were directly related to the dosage of endrin. Phosphate, total protein, and cholesterol showed biphasic distribution with dosage. Serum glucose increased by about 50% as a result of the diet providing 145 µg. of endrin per kilogram of body weight per day. The glucose level was not affected by lower dosages of the insecticide. Low doses of endrin inhibited mobilization of liver glycogen; high doses blocked it almost totally. Trout receiving 14.5 µg./kg. or more of endrin had lowered serum cortisol levels; however, the lowest dose elevated the cortisol level. Growth of the trout was inhibited by doses of

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9.19 DDT SUBSTITUTES

Metcalf, Robert L. (Dept. of Zoology, University of Illinois, Urbana, Ill.)
Critical Reviews in Environmental Control 3, No. 1, 25-59 (Aug. 1972)

DDT, [2,2-bis(p-chlorophenyl)1,1,1-trichloroethane] through its widespread use during and after World War II in the control of insect vectors of malaria, typhus, plague, and other diseases, has saved an estimated 50 million lives and prevented 1 billion illnesses. The use of this insecticide may be the most important single factor in promoting the world population explosion. In India, DDT spraying decreased the cases of malaria from 100 million annually in 1933 to 150,000 by 1966, and decreased the mortality from 750,000 annually to 1,500. In the war on insects, the discovery of DDT resistance in the housefly in Sweden, in 1946, was shocking. Since then DDT resistance has appeared in mosquito, body louse, rat flea, bedbug, cockroach, and 22 species of plant pests. As an environmental pollutant, DDT is found everywhere in water, animals, and people, and it threatens the existence of several animals.

DDT has the following characteristics that make an insecticide useful: a melting point of 108° to 109° C., a vapor pressure of 1.5×10^{-7} mm., almost insoluble in water, nearly odorless, extremely durable and persistent, low hazard to man and higher animals, and low cost. The resistance of insects to DDT has made it ineffective in many applications, and its persistence makes it environmentally unacceptable. Substitute insecticides were investigated among the analogues of DDT, but insect resistance continued to appear. Lindane was successful as a replacement for DDT until insect resistance reduced its usefulness. Polchlorinated compounds called cyclodienes; for example, chlordane, were extensively used until

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145 µg./kg., but not by lower doses. The visceral fat accumulated 4.8 µg. endrin per gram of tissue in the 43 µg./kg. exposure and 8.7 µg. endrin per gram tissue in the 145 µg./kg. exposure. The authors concluded that endrin fed to trout caused dysfunction of physiological processes critical to their survival.
[2 figures, 4 tables, 26 references]

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9.19 PHOTOCHEMISTRY OF MIREX (7.9)

Alley, Earl G., Douglas A. Dollar, Bobby R. Layton, and James P. Minyard, Jr. (Mississippi State Chemical Laboratory, Mississippi State, MS 39762)
Journal of Agricultural and Food Chemistry 21, No. 1, 138-139 (Jan.-Feb. 1973)

Mirex (dodecachloropentacyclo-[5.3.0.0^{2},^{6}.0^{3},^{9}.0^{4},^{8}]decane has been used in the southern U.S. area to control the fire ant. It may become a possible environmental problem. In the present paper, evidence is presented of the degradation of Mirex by photolysis in hydrocarbon solvents. Two major products were produced; one was a monohydro derivative and the other was a dihydro derivative. The elemental analyses, mass spectra, and nmr spectra indicated that chlorine atoms were replaced with hydrogen atoms.
[6 references]

FTP

9.19 COPPER, ZINC, MERCURY, AND LEAD CONTENT OF SOME ADRIATIC FISHES

Clusa, Walter, and Mario Ciaccio (Ist. Merceol., Univ. Bologna, Bologna, Italy)
Chemical Abstracts 77, No. 8, 52095u (Aug. 21, 1972)

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insect resistance appeared. The related compounds, aldrin, dieldrin, and endrin were used successfully until insect resistance affected their usefulness. The next series tried were the organophosphates, malathion, parathion, and diazinon. Malathion was found to be more toxic to insects than to higher animals, and it was used extensively and safely. Other organophosphorus compounds are as toxic to higher animals as to insects. Another group of insecticides used was the carbamates. Carbaryl is an insecticide of this group used successfully against lepidoptera, and it has a relatively low toxicity for mammals. The carbamates are easily biodegradable and are vulnerable to hydrolysis.

The search for the perfect insecticide over 30 years has been concentrated to six promising substitutes for DDT. These are as follows: (1) Malathion, demonstrated to be safe, durable and effective against Anopheles; (2) Carbaryl, useful against lepidoptera, and body louse, safe with precautions; (3) Propoxur, a carbamate, effective against malaria vectors, and safe; (4) Fenitrothion, an organophosphate, persistent on mud walls against mosquitoes, bed bugs, and fleas, safely used with precautions; (5) Dicapthon, an organophosphate, useful against Anopheles, and safe; and (6) Bromophos, an organophosphate, can be used safely against mosquitoes.
[2 figures, 9 tables, 107 references]

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9.19 REDUCING EVAPORATION PLANT POLLUTION AND ITS TREATMENT

Ronnholm, Arvi A. R. (Eng. Div., Oy W. Rosenlew Ab, Pori, Finland)
Chemical Abstracts 78, No. 6, 31669q (Feb. 12, 1973)

9.19 (1.92)

about 2 ng. per gram. Residues remained without change in fish exposed to high carbaryl in water after 28 days in carbaryl free water. The authors suggest the low residue retention in the fish is due to their capacity to metabolize carbaryl and excrete it.
[2 tables, 7 references]

SW

9.19 [ON THE SITUATION REGARDING THE MERCURY CONTENT IN FISH AND THEIR PREPARATION (FOR FOOD)]
ZUR SITUATION DES QUECKSILBERGEHALTES BEI FISCHEN UND IHREN ZUBEREITUNGEN

Meyer, Victor (Institut für Biochemie und Technologie, Bundesforschungsanstalt für Fischerei, Hamburg, Germany)
P. F. Meyer-Waarden (editor)
Archiv für Fischereiwissenschaft 23, Supplement 1, 20 pp. (Oct. 1972) (Berlin, Germany) (In German)

This report was delivered at a working conference of the Nutrition Scientific Council of the German fish industry held on November 14, 1971 at Bad Godesberg, Germany. The report is in response to concern over the presence of mercury in fish used for food, and it reviews the available information with regard to the possible threat to health. The following subjects are covered, in addition to the introduction: Sources of contamination, toxicity of mercury compounds, analytical methods, exposure to and diagnosis of mercury toxicosis, basis for calculating maximum allowable content, importance of the food chain and influence of contaminated waters, and conclusions with precautions regarding mercury in fish from various waters.
[1 figure, 7 tables, 28 references]

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9.3 FDA RELEASES LABELING REGULATIONS

Anonymous
Food Product Development 7, No. 1, 10, 15 (Feb. 1973)

The Food and Drug Administration has released food labeling regulations with emphasis on nutritional content of products. The final effective date is December 31, 1974, but all labels ordered after December 31, 1973 must comply with regulations. A summary of the FDA release follows.

Nutritional labeling is still voluntary, but if nutritional claims are made in advertising or labeling the full nutritional labeling regulations will apply. Where food standards require additional nutrients, full nutritional labeling regulations also apply. The nutritional label will state size of serving, caloric content, content of protein, fat, and carbohydrate in grams per serving, and percentage of U.S. Recommended Dietary Allowance for vitamins and minerals. Declaration of sodium and cholesterol will be permitted without enforcement of the full disclosure regulation.

Compliance testing will be performed on 12 consumer units by methods of the Official Analytical Chemists Association or other reliable procedures.

Two classes of nutrients have been defined relative to declared value. Class I: Added nutrients in fabricated or fortified foods. Class II: Naturally occurring nutrients. For Class I, the vitamin, mineral, and protein content must be equal to or more than the declared values. For Class II, these nutrients must equal at least 80% of the declared values.

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9.3 SYMPOSIUM ON THE RECALL OF FOOD PRODUCTS, 32ND ANNUAL MEETING OF THE INSTITUTE OF FOOD TECHNOLOGISTS

(Various authors and articles as listed below)
Food·Drug·Cosmetic Law Journal 27, No. 11, 660-735 (1972) (Commerce Clearing House, Inc., 4025 West Peterson Ave., Chicago, IL 60646)

"Introductory Remarks--Murphy's Law and Consumer Protection," by Paul Kahn (ITT Continental Baking Co.), pp. 660-661.

The author offered the hope that this symposium would stimulate management of the food industry to prepare in advance for an eventuality [product recall] that everyone hopes will never come.

"Recalls -- Definition and Exposition," by Sam D. Fine (Office of the Commission for Compliance, FDA, PHS, U.S. Dept. of Health, Education, and Welfare, Washington, D.C.), pp. 662-667.

The recall policy of the Food and Drug Administration (FDA) is explained, beginning with basic definitions and delineating internal FDA assignment of responsibility for recall decisions.

"Voluntary Recalls or Delegated Seizures: The Legal Considerations," by Eugene I. Lambert (Covington and Burling, Washington, D.C.), pp. 668-672.

The author discusses the legal considerations, regarding the Food, Drug, and Cosmetic Act and other forms of civil liability, relative to recalls of food (Due to the absence of any specific statutory authority to require recalls, any recall is "voluntary," that is, the firm is not legally obligated to institute the recall).

"Insurance for Product Withdrawal," by John J. Kircher (Defense Research Institute), pp. 673-679.

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9.3 (1.12) TROPICAL TUNA MANAGEMENT IN THE EASTERN PACIFIC

Joseph, James (Inter-American Tropical Tuna Commission)
Fishing News International 12, No. 2, 12-14, 17 (Feb. 1973)

The tuna fish industry began in the waters between Los Angeles and Catalina Island with the capture of albacore for canning. To ensure a constant source of supply the albacore fleet moved into the waters off northern Mexico where the yellowfin and skipjack tuna could be caught year round. The fishery developed, and by the beginning of World War II, 85,000 short tons (2,000 lb. per ton) of yellowfin and skipjack tuna were taken annually. After a decline during the war years, the catch of the two species increased to 175,000 tons in 1950. The nations bordering the eastern Pacific became concerned, at this time, over the rate of exploitation of not only the tuna species but the bait fish also. The Central American nations had valuable resources in bait fish (used in catching tuna), and the disappearance of the anchoveta, an important bait fish, off the coast of Costa Rica was further cause for concern.

As a result of the concern over the tuna and the bait fish, the Governments of Costa Rica and the United States joined in a treaty to establish the Inter-American Tropical Tuna Commission. The treaty was signed in 1949. The most important duty of the Commission is to make recommendations, on the basis of scientific investigation, to the treaty partners for maintaining the populations of tuna at the levels for maximum sustainable catches.

The first task of the scientific staff was to make a history of catches and catch effort and to start a uniform logbook system of recording current catch

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9.3 INTERNATIONAL REGULATION OF MARINE FISHERIES. A STUDY IN REGIONAL CO-OPERATION

Koers, Albert W.
Fishing News (Books) Ltd., 23 Rosemount Ave., West Byfleet, Surrey, England (1973). Price £5.50.

According to the publisher, this book is intended to help the evolution of a much needed law of the sea in relation to fisheries. It gives information on the existing international fisheries organizations; it discusses the needs and claims of coastal state fisheries and distant water fisheries; and it outlines the logical pros and cons of conceivable courses within the desired framework of an acceptable basis of international law. The book contains six chapters dealing with: (1) the extra-legal context of the international law of marine fisheries, (2) a chronology of international fisheries organizations, (3) the structure of international fisheries organizations, (4) the functions and powers of the organizations, (5) alternatives and proposals, and (6) a subjective approach to the future international law of the sea. FTP

9.3

The author discusses the protection that insurance companies offer to manufacturers should they have a recall of food products.

"Production Records: Tracing and Recording of Ingredients," by Alan Thomas (M & M/ Mars, Hackettstown, N.J.), pp. 680-688.

Advice is given on organizing and using codes on invoices of raw materials, quality control records, production schedules, processing records, and a final product identification system, to enable one to identify and locate suspect goods.

"Distribution of Processed Foods," by James Scala (Applied Nutrition, Thomas J. Lipton, Inc.), pp. 689-695.

The author recommends the universal product code for solving the problem of locating suspect goods in distribution.

"Recalls International," by Paul M. Karl (CPC International, Englewood Cliffs, N.J.), pp. 696-701.

The international regulatory framework is described, including the European Economic Community and the Joint FAO/WHO Food Standards Program/ Codex Alimentarius Commission.

"The Removal and Disposal of Suspect Product," by Charles Livingston (Corporate Quality Assurance, Borden, Inc.), pp. 702-708.

The author reviews the process of food recall from alert to disposition of food products.

"Recall of Food Products; Emergency Standby Procedures at the Home Office," by Paul Kahn (ITT Continental Baking Co.) and Donald C. Healton (Regional Food and Drug Director, Region V, FDA), pp. 709-735.

This article deals with the setting up of emergency standby procedures for recalls, adaptable to any organization, which can help avert more serious problems by avoiding preventable pitfalls. [22 illustrations] FTP

9.3

Claims of nutritional superiority of one product over another must be based on a difference of 10% or more. Labeling of health or "natural" foods may not claim that natural sources of nutrients are more nutritious than chemically produced sources. Special dietary foods' labels will be affected by proposed changes to the regulations. The regulations will deal with dietary supplements under one part of the code and will deal with products used under medical supervision in another part of the code. The label "imitation" will no longer be necessary if the product is equal, nutritionally, to the product it resembles, if the proposal for this change is accepted. Declaration of all optional ingredients in all standardized foods will be required except spices, flavorings, and colors. SW

9.3 TOWARDS A BROAD ECOLOGICAL MODEL OF FISH COMMUNITIES AND FISHERIES

Regier, Henry A. (Dept. of Zoology, University of Toronto, Toronto, Ontario, Canada), and H. Francis Henderson (Fish Stock Evaluation Branch, Dept. of Fisheries, FAO, Rome, Italy)

Transactions of the American Fisheries Society 102, No. 1, 56-72 (Jan. 1973)

In attempts to manage the fishery resources, particularly those in fresh waters, evidence is accumulating that the classical fishery models are deficient in the extent and the rates of change through increased impact of humans. The steady state of equilibrium assumptions of population dynamics as simplifications of fishing effects on fish populations are no longer fully accepted. In addition, rapid changes in species composition cannot be incorporated into models of production or economic yield without large increases in data gathering, bookkeeping, and computer facilities.

The authors have constructed a model which they believe overcomes the inadequacies of the classical models. The new model is complex: it includes physical, chemical, biological, and ecological factors. A diagram of the model is shown in the article with mathematical relationships. The authors suggest that the model will provide a context in which theory can be generalized and applied more broadly at less cost.

[5 figures, 30 references] SW

9.3 (1.12)

information. Other studies showed that yellowfin and skipjack tuna are found in nearly all the tropical oceans of the world. They found that yellowfin do not migrate great distances as do the albacore, bluefin, and skipjack. Furthermore, the skipjack in the eastern Pacific are in the adolescent stage and originate in water farther to the west where they return to spawn. Studies showed that yellowfin grow very rapidly; they weigh 130 lb. at 4 years of age. Skipjack are also fast growing but grow no larger than 25 lb. Abundance of fish is dependent on fluctuations in temperatures of the water and food supplies; fishing success is related to the same factors. The staff was able to formulate during the 1950's mathematical models for yellowfin which were useful in providing guidelines for management. The model indicated that a yield of 95,000 tons annually could be supported. By 1961, this yield was exceeded and the need to reduce fishing effort of yellowfin was known; however, skipjack was underfished. The yellowfin fishery has been under management since 1966, and the abundance of the stock has remained high, with a 2-month fishing season in 1972. Thirteen nations have participated in the fishery under the treaty.

The Commission has many complicated problems in the management of the tuna fishery which now operates in the Atlantic also. The Commission has been able to deal with a few of the problems; its present efforts continue on analyses of the catch statistics, the population structure of yellowfin, and improvement of models of the stocks.

[2 figures, 1 table, 1 illustration] SW

9.3 SCIENTIFIC ASPECTS OF MARITIME SOVEREIGNTY CLAIMS

Wooster, Warren S. (Scripps Institution of Oceanography, University of California at San Diego, La Jolla, Calif.)
Ocean Development and International Law Journal 1, No. 1, 13-20 (Spring 1973)
[New journal published by Crane, Russak & Co., Inc., 52 Vanderbilt Ave., New York, NY 10017. Subscription price $26.00, single copy $8.00]

The author compares the scientific arguments used to justify Peruvian claims for extension of maritime sovereignty with available oceanographic information on the eastern South Pacific.
[16 references] FTP

9.6 FISHERY PUBLICATIONS, CALENDAR YEAR 1970: LISTS AND INDEXES

Engett, Mary Ellen, and Lee C. Thorson
NOAA Technical Report NMFS CIRC-377, iv + 34 pp. (Dec. 1972). U.S. Department of Commerce, NOAA, National Marine Fisheries Service, Seattle, Wash. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price 45 cents.

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (until October, 1970 the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service) in calendar year 1970 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: Circular, Data Report, Fishery Industrial Research, Fishery Leaflet, and Special Scientific Report--Fisheries.
[1 figure] Authors' abstract

9.6 QUALITY CONTROL IN THE FOOD INDUSTRY VOLUME 3

Herschdoerfer, S. M. (editor)
Published by Academic Press Inc., 111 Fifth Ave., New York, NY 10003. (1972), 485 pp. Price not given.

Volume 1 (previously published) covered the organization of quality control with additional material on chemical and microbiological health problems, statistical methods, tasting panels, and food standards.

Volume 2 (previously published), in addition to other food products, covered fish and fish products.

Although volume 3 covers other fish products, there are chapters of interest to the food processing community. These chapters include: "Flavoring Materials and Their Quality Control," "Quality Control of Prepared Food Mixes," "Quality Assurance of Incoming Packaging Materials for the Food Industry," and "Automatic Control." This last chapter is a discussion of automatic measuring and regulating principles useful in food processing. SW

9.6 ECOLOGY AND ECONOMICS: CONTROLLING POLLUTION IN THE 70'S
(9.19)

Goldman, Marshall I. (editor)
Published by Prentice-Hall, New Jersey (1972), xi + 233 pp. Price $6.95.
Richard H. Day (reviewer)
Transactions of the American Fisheries Society 102, No. 1, 199 (Jan. 1973)

The variety and extent of pollution and ideas for its abatement are presented in this nontechnical book. The reviewer criticized the book for failure to address itself to the social problem of teaching man to live with less material affluence in order to restore the environment. SW

9.6 1001 QUESTIONS ANSWERED ABOUT THE OCEANS AND OCEANOGRAPHY

Taber, Robert W., and Harold W. Dubach
Published by Dodd, Mead & Company, New York (1972), 269 pp. Price not given.

The book covers the field of oceanography and is divided into 15 chapters. Most of them are devoted to the physical and geographical aspects of the oceans. However, there are five chapters in the fields of biology, ecology, food, pollution, and man in relation to the sea. The last chapter is about myths and legends.

The style of the book is in the form of questions and answers. There is a bibliography and an index. SW

9.6 MARINE FOOD AND GAME FISHES OF CALIFORNIA

Fitch, John E., and Robert J. Lavenberg
Published by the University of California Press, Berkeley, Calif. (1971), 179 pp.
Price $2.35.
Richard S. Shomura (National Marine Fisheries Service, Tiburon Fisheries Laboratory, Tiburon, CA 94920) (reviewer)
Transactions of the American Fisheries Society 102, No. 1, 202 (Jan. 1973)

The reviewer believes that the book provides the general public with interesting facts on natural history and is a good source of fishery information. SW

9.6 WORLD FISHERIES POLICY: MULTIDISCIPLINARY VIEWS

Rothschild, Brian J. (editor) (National Marine Fisheries Service, NOAA, Southwest Fisheries Center, La Jolla, Calif.)
Published by the University of Washington Press, Seattle, Wash. (1972), 340 pp. Price $9.50.

This book is the result of a series of interdisciplinary seminars sponsored by the Graduate School of Public Affairs of the University of Washington. Fisheries experts from several countries evaluated the effectiveness of past fisheries policies and described concepts and attitudes that may shape future policies.

The book comprises 16 articles which should be of interest to those in the fields of territorial conflicts, fisheries of the developing countries, conservation standards, and allocation of catches. Additional fields of interest include the future world food supply, application of systems analysis and computer technology to improve fisheries management, and the social goals of fisheries management.

The book will be of special interest to participants in the conference on "Law of the Sea" sponsored by the United Nations. SW

9.6 REVIEWS
(1.81)

An Economic Study of the Oyster Fishery of the Maritime Provinces
Morse, N. H.
Fisheries Research Board of Canada Bulletin 175, Ottawa, Canada (1971), 81 pp. Paperback $2.25.

Paralytic Shellfish Poisoning in Eastern Canada
Prakash, J., C. Medcof, and A. D. Tennant
Fisheries Research Board of Canada Bulletin 177, Ottawa, Canada (1971), 87 pp. Paperback $3.00.

Pacific Oyster Raft Culture in British Columbia
Quayle, D. B.
Fisheries Research Board of Canada Bulletin 178, Ottawa, Canada (1971), 34 pp. Paperback $2.00.

Herbert Hidu (Ira C. Darling Center, University of Maine, Walpole, ME 04573) (reviewer)
Transactions of the American Fisheries Society 102, No. 1, 200-201 (Jan. 1973)

The reviewer was impressed with the extensive treatment given to the subject in the first bulletin. He commented that the bulletin on shellfish poisoning was lighter reading but gave all aspects of the problem. Practical instructions for operating an oyster raft culture venture were given in the third bulletin. SW

9.6 THE WATER'S EDGE: CRITICAL PROBLEMS OF THE COASTAL ZONE

Ketchum, Bostwick H. (editor)
Published by the Massachusetts Institute of Technology, Cambridge, Mass. (1972), i-xi + 393 pp. Price not given.

This book contains the reports of the Coastal Zone Workshop, held at Woods Hole, Mass., from May 22 to June 3, 1972. There were 112 participants to the workshop. They contributed reports under two major sections. The first section, "Constraints on Man's Activities," covered the following topics: living resources, nonrenewable resources, recreation and aesthetics, urban and industrial development, transportation, coastline changes, and pollution from waste disposal.

In the second main section, "Management of Coastal Resources," the participants of the workshop reported on the following topics: research strategies, allocating resources, management, legal aspects, and a systems view.

There is a bibliography at the end of each report. There is also a general bibliography and an index. SW

2.3 APPARATUS FOR REMOVING VISCERA FROM A FISH

Wiggins, Gary K.; assignee Marine Construction & Design Co., Seattle, Wash. (pat.)
U.S. Patent 3,707,019 (Dec. 26, 1972)

This apparatus is designed to remove the viscera, and in female fish the roe, from fish prior to the final cleaning operation. It is particularly useful in the processing of salmon. FTP

6.34 ALGINATE PAPER

Prouse, Ronald Ernest, Anthony Alfred West, Derek Anthony King, and Roger Poulson (Carreras Ltd.) (pat.)
German Offen. 2,212,607 (Oct. 26, 1972)
Chemical Abstracts 78, No. 6, 31732e (Feb. 12, 1973)

2.3 SHRIMP PROCESSING

Bynagte, P. W.; Westgate-California Foods, Inc. (pat.)
U.S. Patent 3,705,040
Food Technology 27, No. 3, 92 (Mar. 1973)

Shrimp are dipped into a selected aqueous phosphate salt solution for at least 2 min. with agitation, and then they are cooked, cooled, and peeled. FTP

9.16 OYSTER SPAWNING FACILITY

Dunathan, Jay P.; assignee Oceanography Mariculture Industries, Inc., Riviera Beach, Fla. (pat.)
U.S. Patent 3,707,948 (Jan. 2, 1973)

This invention consists of a closed system for conditioning and spawning oysters in a controlled temperature environment. FTP

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402 - Subscription price: $6.50 per year, ($1.75 additional for foreign mailing). Single copy 65 cents

11 (9.16) THE DESIGN AND CONSTRUCTION OF THE UNIVERSITY OF DELAWARE MARICULTURE LABORATORY

Pruder, Gary D., Charles Epifanio, and Robert Malouf (College of Marine Studies, University of Delaware, Newark, DE 19711)
Sea Grant Report DEL-SG-7-73, 96 pp. (1973), College of Marine Studies, University of Delaware, Newark, DE 19711. Price not given.

This bulletin describes the work involved in the design and construction of a mariculture laboratory at the College of Marine Studies of the University of Delaware. It covers the materials, methods, and equipment selected and a summary of costs and suppliers. Although the eastern oyster Crassostrea virginica was the species of primary interest, the facilities were designed to insure flexibility for controlled culture of a wide variety of marine organisms and for the support of research efforts in related problem areas. The laboratory was designed to fit into an already existing building of 10,000 square feet space; some equipment, also, was available. The purpose of preparing and disseminating the information in this report was to provide a guide for others faced with a similar task. Major sections deal with statements of preliminary specifications, report of survey of 11 existing major marine laboratory facilities, final design of specifications, construction and initial operation, cost summary, and three appendixes giving the boiler, chiller, and pump specifications.
[51+4 figures, 4 references] FTP

0.33 (1.36) EPITHELIAL MUCINS OF THE ATLANTIC SALMON (SALMO SALAR L.)

Harris, Jack, and Stephen Hunt (Dept. of Biological Sciences, University of Lancaster, Bailrigg, Lancaster, United Kingdom)
Biochemical Society Transactions 1, No. 1, 153-155 (Jan. 1973) (Biochemical Society, 7 Warwick Court, London WC1R 5DP, England)

[Mucins, composed of conjugated carbohydrates and proteins, occur in mucus and saliva and are widely distributed in nature. The mucous membrane is a tissue lining of tubular cavities (such as the gut, uterus, and trachea), and it consists of a layer of epithelium containing many single-celled mucous glands. These glands secrete mucus. Abstractor's note]

Preliminary analysis of the mucus components of salmon were performed relative to secretion of mucus from the epidermis.

Chromatography and further electrophoresis of whole mucus revealed three major components. Continued analysis indicated the presence of mannose, fucose, glucose, galactose, glucosamine, and galactosamine. Protein content of the mucus was 62% of the dry weight; seventeen amino acids were present, with serine, threonine, histidine, glycine, glutamic acid, and aspartic acid predominating. No free thiol groups were present.
[2 figures, 7 references] SW

0.32 (1.92) LOW MOLECULAR WEIGHT PROTEINS OF PIKE (ESOX LUCIUS) WHITE MUSCLES--I. EXTRACTION AND PURIFICATION--POLYMORPHISM

Bhushana Rao, K. S. P., and Ch. Gerday (Laboratory of General Biology, Faculty of Sciences, University of Liège, B-4000 Liège, Belgium)
Comparative Biochemistry and Physiology 44, No. 3B, 931-937 (Mar. 15, 1973)

Other workers reported isolation of low molecular weight proteins in the sarcoplasmic protein fraction of white muscle from several carps, a species of tilapia, several species of cod, and a species of hake. Information on evolutionary changes of these protein molecules and their genetics can be gained in studies of these low molecular weight proteins.

Soluble proteins were extracted from fillets of white skeletal muscle of pike. The extract was fractionated with acetone and filtered through various columns to obtain a narrow range of fractions that corresponded to low molecular weight proteins described in other reports. After purification using chromatographic techniques the fractions were analyzed by starch gel electrophoresis.

The patterns seen in electrophoresis analysis of purified fractions were found to be species specific. In addition, low molecular weight proteins in pike resemble those in other fish and all these fish are similar in chromosomal count with few exceptions. The authors assumed that these proteins have a common ancestral gene, and they suggest that regional gene duplication and tetraploidization can explain the number of low molecular weight proteins in different species of fish.
[4 figures, 1 table, 21 references] SW

0.36 FISH LIVER FRUCTOSE 1,6-DIPHOSPHATASE. I. PURIFICATION OF THE ENZYME FROM GENYPTERUS CHILENSIS AND STUDIES ON ADENOSINE 5'-MONOPHOSPHATE INHIBITION

Gonzalez, Ana Maria, Fresia Gonzalez, Sighart Golf, and Frank Marcus (Instituto de Bioquímica, Universidad Austral de Chile, Valdivia, Chile)
Journal of Biological Chemistry 247, No. 19, 6067-6070 (Oct. 10, 1972)

[Fructose 1,6-diphosphate is an intermediate compound in the pathway of the synthesis of glucose from nonglucose precursors such as the compounds resulting from glycolysis, intermediates of the citric acid cycle, several amino acids, and others. This synthesis of glucose is called gluconeogenesis. The enzyme fructose 1,6-diphosphatase, catalyzes the hydrolysis of fructose 1,6-diphosphate in the formation of the next compound in the pathway of gluconeogenesis, fructose 6-phosphate. Since the formation of glucose in this manner is contrary to the mechanisms involved in ongoing glycolysis, a modifying agent is required in the cell to regulate the activity of the enzyme fructose 1,6-diphosphatase. The modifying agent is adenosine 5'-monophosphate (AMP) which reduces the activity of the enzyme and provides part of the mechanisms which regulate all enzyme activities in the cell. Gluconeogenesis occurs mainly in the liver and kidney. (Abstractor's note)]

Other studies have demonstrated that the enzyme fructose 1,6-diphosphatase derived from poikilotherms (animals whose body temperature is close to the environmental temperature) is also inhibited by AMP. However, the enzyme derived from homeotherms (animals with constant body temperatures independent of the environmental temperature) decreases in activity as the temperature is increased.
(over)

0.32 (1.92) FREE AMINO ACID CONTENTS OF THE SKELETAL MUSCLE OF CARP AT JUVENILE AND ADULT STAGES

Siddiqui, A. Qayyum, Anwar H. Siddiqui, Khalida Ahmad (Dept. of Zoology, Aligarh Muslim University, Aligarh, India)
Comparative Biochemistry and Physiology 44, No. 3B, 725-728 (Mar. 15, 1973)

Biochemical composition of muscle tissues, particularly the amino-acid content, of juveniles and adults of three carp species was determined. The skeletal muscle of Labeo rohita (Ham.) Cirrhina mrigala (Ham.), and Catla catla (Ham.) were sampled and homogenized in 80% alcohol. The amino acids were extracted and separated, identified, and quantified by techniques of chromatography and electrophoresis.

Eighteen amino acids were identified; ten of these were essential. Cysteine quantitatively dominated the amino-acids present in the juveniles of L. rohita and C. mrigala. Aspartic acid was the dominant amino acid in juvenile C. catla. In the adults of all three species the following amino acids were found in high concentrations in decreasing order: lysine, glycine, cysteine, aspartic acid, and histidine. Amino-acid levels were lower in muscle of the juveniles than in muscle of the adults. The authors suggest that the difference may be due to active incorporation of amino acids in building tissue and less metabolic breakdown of tissue in the juvenile muscle.
[2 tables, 11 references] SW

0.36

Experiments were performed to compare the activity of the enzyme fructose 1,6-diphosphatase derived from fish liver to the same enzyme derived from rabbit liver. A highly purified enzyme was prepared from the liver of the fish G. chilensis. Tests showed that the enzyme from fish liver responded to AMP, KCl, and temperature in a similar manner as the enzyme derived from rabbit liver. However, the fish-derived enzyme is less sensitive to AMP inhibition than the rabbit-derived enzyme at the same temperature.
[3 figures, 2 tables, 21 references] SW

0.38 TROUT INTESTINAL ALKALINE PHOSPHATASES.
I. PHYSICAL-CHEMICAL CHARACTERISTICS

Whitmore, Donald H., and Erwin Goldberg (Dep. Biol. Sci., Northwest. Univ., Evanston, Ill.)
Chemical Abstracts 77, No. 25, 161422u (Dec. 18, 1972)

0.38 TROUT INTESTINAL ALKALINE PHOSPHATASE.
II. EFFECT OF TEMPERATURE ON ENZYMIC ACTIVITY IN VITRO AND IN VIVO

Whitmore, Donald H., and Erwin Goldberg (Dep. Biol. Sc., Northwest. Univ., Evanston, Ill.)
Chemical Abstracts 77, No. 25, 161421t (Dec. 18, 1972)

.12 STAINLESS STEEL FOR SALINE-WATER SERVICE

Kopecki, E. S. (American Iron and Steel Institute, 150 E. 42d St., New York, NY 10017)
Chemical Engineering 80, No. 2, 124, 126-128 (Jan. 22, 1973)

Many stainless steels are excellent for salt-solution applications. This article contains a discussion of the experiences gained in various desalting plants. Such information is useful to engineers who have to handle brackish or more concentrated saline waters in plant operations.
[7 figures, 6 references] FTP

0.35 (0.5) NEW ANTIBACTERIAL BROMOIDOLE METABOLITES FROM THE MARINE SPONGE POLYFIBROSPONGIA MAYNARDII

Van Lear, G. E., G. O. Morton, and W. Fulmor (Lederle Laboratories, American Cyanamid Co., Pearl River, NY 10965)
Tetrahedron Letters No. 4, 299-300 (Jan. 1973)

Two new dibromo antibacterial compounds were obtained by aqueous alcohol extraction of the Caribbean sponge P. maynardii. The first is a dibromoaminoalkyl substituted indole. The second is 3-(2-aminoethyl)5,6-dibromo indole.
[4 references] FTP

0.322 (8.51) FREE AMINO ACIDS IN FRESHWATER PLANKTON AND ITS MEDIUM

Jankevicius, K., S. Budriene, A. Baranauskiene, V. Lubianskiene, G. Jankaviciute, T. Kiselyte, and J. Biveinis (Inst. Bot., Vilnius, U.S.S.R.)
Chemical Abstracts 77, No. 17, 111635v (Oct. 23, 1972)

0.118 (7.43) USE OF STRIP-LINE CONFIGURATIONS IN MICROWAVE MOISTURE MEASUREMENT

Kent, M. (Torry Res. Stn., Dep. Trade Ind., Aberdeen, Scotland)
Chemical Abstracts 77, No. 24, 159708y (Dec. 11, 1972)

0.36 (1.88) ANAEROBIC GLUCOSE DEGRADATION IN THE SEA MUSSEL MYTILUS EDULIS L.

De Zwann, Albertus, and Willibrordus J. A. van Marrewijk
Comparative Biochemistry and Physiology 44, No. 2B, 429-439 (Feb. 15, 1973)

In reports from other work, anaerobic degradation of glycogen in sea mussel by specific enzymes was examined. Succinate and alanine accounted for 50% of the total glycogen that was degraded. To identify the other products of anaerobic degradation, experiments were performed on anaerobic metabolism of glucose in the sea mussel.

Mussels were collected from a natural bed on the Netherland's coast and injected with ^{14}C labeled glucose. They were placed in previously boiled sea water; one group was held for 24 hr. and another group was held for 48 hr. The mussels were then homogenized and subjected to a fractionization procedure using solvent extraction, lyophilization, precipitation, filtration, centrifugation, ion exchange, and separation and purification by chromatography. Radioactivities of two major fractions, amino acids and organic acids, were determined.

About half of the isotope ^{14}C was incorporated in four amino acids: alanine, glutamic acid, aspartic acid, and glutamine. Alanine accounted for about 75% of the radioactivity. The organic acids accounted for just over 36% of the radioactivity, and were identified as follows: succinate plus lactate, 52.3%; malate, 14.7%; citrate, 2.2%; fumarate, 2.2%; and pyruvate, 1.0%. The amino acids and organic acids together accounted for 85% of the total radioactivity of the mussel homogenated; the incubation times of 24 and 48 hr. made little difference in the

(over)

0.39 ACCELERATION BY ECDYSTERONE OF PREMOULT SUBSTAGES IN THE CRAYFISH

Stevenson, J. R., and J. A. Tschantz (Dept. of Biological Sciences, Kent State University, Kent, OH 44242)
Nature 242, No. 5393, 133-134 (Mar. 9, 1973)

[Ecdysterone is a hormone that controls molting in insects and crustacea. In insects the hormone is secreted by the thoracic gland and in crustaceans by the y-gland. Abstractor's note]

If these glands are removed neither of the organisms will molt. If these intact organisms enter the premolt stage, removal of the glands will have no effect on continuation of the molting process. The authors suggest that this hormone acts in several ways in addition to initiating premolt. To elucidate these effects experiments were performed on crayfish with injections of ecdysterone.

The results indicate that the hormone in addition to initiating premolt, caused the crayfish to enter the next molting stage sooner, and continued to stimulate the animal in preparatory activity for the next molt.

[1 table, 25 references] SW

0.39 SPECIFIC ROLE OF GLUCOSE IN RAPID LIPOGENIC ACTIVATION IN VIVO

Baker, N., and R. J. Huebotter
Journal of Lipid Research 14, No. 1, 95-101 (Jan. 1973)

The effects of glucose, after fasting, on the synthesis of lipids were investigated. Mice were fed a fat-free diet containing 58% glucose for 3-4 days and then deprived of food for 18-28 hr. before the experiment. One group of mice was injected with ^{14}C-labeled glucose and killed after 30 min. The extent of ^{14}C-incorporation into total lipid fatty acids (TLFA) and all other end products in the carcass was measured. The other fasted mice were divided into three groups and fed ^{14}C-labeled glucose in one of three forms: solid glucose, or a 30% solution, or a fat-free 58% glucose diet. After 40 min., they were killed and their carcasses were analyzed for ^{14}C in TLFA and other products.

The results of the tests indicated that in the mice that were fasted and then injected with ^{14}C-labeled glucose, only a small amount was converted to fatty acids. Most of the glucose was converted to end products such as CO_2 and other metabolic intermediates. In the mice fed the ^{14}C-labeled glucose in meals there was a rapid increase in the conversion to fatty acids. A hyperglycemic response and glycosuria were observed in mice fed solid glucose or glucose in solution. There was a much lower glycemic response in rats fed the 58% glucose fat-free diet. The authors concluded that lipogenesis can be rapidly activated by glucose as the sole dietary constituent.

[3 figures, 3 tables, 27 references] SW

0.4 POSSIBLE MICROBIAL CONTRIBUTION TO NITROSAMINE FORMATION IN SEWAGE AND SOIL

Ayanaba, Abateni, Willy Verstraete, and Martin Alexander (Dept. of Agronomy, Cornell University, Ithaca, NY 14850)
Journal of the National Cancer Institute 50, No. 3, 811-813 (Mar. 1973)

The nitrosamines are reported to be carcinogens in rats; thus, these compounds are cause for concern through possible exposure to them in food, water, or elsewhere in the environment. The nitrosamines may be present in polluted water and soils; the compounds may be assimilated from the soil by food crops. They may appear in waterways after being leached from the soil.

Tests were performed to determine the possibility of nitrosamine formation from sewage and a suitable substrate. Municipal sewage samples were divided into four categories by pH: 4.0, 5.0, 6.0, and 7.0 and incubated at 30° C. on a rotary shaker. Trimethylamine (TMA) and nitrate-nitrogen were added to the cultures and incubation was continued. The results of the tests indicates that the least amount of dimethylamine (DMA) was formed in the cultures adjusted to pH 7.0; the largest amount of nitrate nitrogen was produced at that pH; and the largest amount of dimethyl nitrosamine (DMNA) was produced at the same pH. None of these reactions occurred with filter-sterilized sewage. Forest soil incubated with DMA, glucose, and nitrate-nitrogen also produced DMNA.

The authors concluded that microbial contribution to formation of a nitrosamine in sewage or soil may occur in one of the following routes: (1) by converting tertiary amines or other nitrogen containing compounds to secondary amines;

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0.33 (2.3) ISOLATION AND NUTRITIONAL EVALUATION OF PROTEIN FROM SHRIMP WASTE EFFLUENT

Toma, Ramsis Barsoum (Louisiana State Univ., Baton Rouge, La.)
Chemical Abstracts 78, No. 3, 14734q (Jan. 22, 1973)

0.4

(2) by reduction of nitrate, or oxidation of ammonia to nitrite; and (3) by causing an enzymatic reaction between nitrite and secondary amines. The nitrosamines may be formed nonenzymatically under acid conditions. Nitrosamines have not yet been found in sewage or soil; however, the results of these tests indicate a potential for the formation of such compounds in these environments.
[1 table, 14 references] SW

0.33 CARBON DIOXIDE FIXATION AND TRANSLOCATION IN BENTHIC (0.36)(6.3) MARINE ALGAE. II. TRANSLOCATION OF CARBON-14 LABELED ASSIMILATES IN LAMINARIA HYPERBOREA AND L. SACCHARINA

Schmitz, Klaus, Klaus Luening, and Johannes Willenbrink (Bot. Inst., Univ. Koeln., Cologne, Germany)
Chemical Abstracts 77, No. 17, 111611j (Oct. 23, 1972)

0.39 LEAD-210 IN SELECTED MARINE ORGANISMS (9.19)

Beasley, Thomas Miles (Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98386t (Oct. 9, 1972)

.36 (1.88)

results except for glutamic acid which were 8.8 and 13.6%, respectively, of the radioactivity in the amino-acid fractions.

The authors believe that the formation of glutamate and succinate is important for the balance of reduced and oxidized coenzymes in the mitochondrion.
[2 figures, 4 tables, 17 references] SW

0.39 EFFECT OF MAGNESIUM ON HORIZONTAL CELL ACTIVITY IN THE SKATE RETINA

Dowling, John E., and Harris Ripps (Depts. of Ophthalmology and Physiology, New York University School of Medicine, New York, NY 10016)
Nature 242, No. 5393, 101-103 (Mar. 9, 1973)

Synaptic transmission between photoreceptors and retinal neurones of vertebrates is chemically controlled (such as by acetylcholine). Other reports indicated that the photoreceptor releases a depolarizing transmitter in the dark and that admission of light decreases the flow of this substance.

In experiments on skate retina horizontal cells, the influence of magnesium on their electrical properties was determined. The results indicate that these cells are in a partially depolarized state in the dark due to the continual release of a depolarizing neurotransmitter from the photoreceptors. The presence of high levels of magnesium decreases the release of neurotransmitter (similar to the response to light) causing the cell to hyperpolarize and prevent light evoked responses. Other workers reported that anoxia and metabolic poisons produced similar effects on horizontal cells. The activity of depolarizing transmitter (secreted by vertebrate photoreceptors) on bipolar cell responses, the authors suggest, is not fully clear. The identity of the photoreceptor neurotransmitter of the skate (a depolarizing agent) has been determined by other workers to be L-glutamate.
[3 figures, 33 references] SW

0.38 EFFECT OF STARVATION ON THE ACTIVITIES OF GLUCOSE 6-PHOSPHATE-METABOLIZING ENZYMES IN FISH

Nagayama, Fumio, Hiroshi Ohshima, Kazutami Umezawa, and Morikazu Kaiho (Tokyo Univ. Fish., Tokyo, Japan)
Chemical Abstracts 77, No. 17, 112850y (Oct. 23, 1972)

0.5
(3.333)

SALMON-CANNING WASTE WATER AS A MICROBIAL GROWTH MEDIUM

Strasdine, G. A., and Joanne M. Melville (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 12, 1769-1771 (Dec. 1972)

A useful form of pollution abatement is the conversion of wastes to marketable products through the action of microorganisms and other agents. The waste water from a salmon-canning operation was investigated for possible use as a growth medium for bacteria. The average salmon-canning effluent (SCE) flow from the plant was 1135.5 liters per minute and the total solids content after filtration through glass wool was 1.91 mg. per milliliter. On a dry weight basis, (per mg. of solids) the content of nitrogen was 79.5 mg. and carbohydrates 14.2 mg., of which 28% was free glucose. A medium was prepared consisting of 0.2% dipotassium phosphate, 0.02% magnesium sulfate, 0.002% ferric sulfate, 0.002% manganous sulfate, 0.5% dextrose, and 1.91 mg. SCE (dry weight) per milliliter of medium. The pH of the medium was 7.0-7.1 after sterilization. The growth-promoting capability of this medium was compared to the same medium but with SCE replaced by commercially prepared enzymatic digests of meat, casein, or soya, or acid hydrolyzed casein or soya, or beef extract. Of the six organisms tested, maximum cell yield did not occur in media containing acid hydrolyzed casein or enzymatic digest of soya nor in the medium containing beef extract. SCE medium promoted maximum growth of two organisms: Sorangium 495, and Pseudomonas putrefaciens. The other species showed good growth in SCE medium compared to media with the other sources of nitrogen.

(over)

0.5
(3.3)

CONDITIONS NECESSARY FOR STERILITY TESTING OF OF HEAT PROCESSED CANNED FOODS

Evancho, G. M., D. H. Ashton, and E. J. Briskey (Campbell Institute for Food Research, Camden, NJ 08101)
Journal of Food Science 38, No. 2, 185-188 (Feb. 1973)

Sterility testing is used to determine the effectiveness of processing and the integrity of containers. The reliability of the tests depends upon exclusion of contamination during any of the subculture operations. Other workers have reported the necessity of controls in sterility testing of canned foods. They reported that a common laboratory technique such as flaming test tubes could introduce contamination. In addition, long hair has been implicated as the source of contamination in laboratory sterility tests. Experiments were performed on some steps of sterility testing to isolate factors contributing to contamination.

A total of 4,740 cans of 11 different pasta-containing products was obtained from facilities on the east and west coasts and in the Midwest. Cooked meat media (CMM) and brom cresol purple broth (BCP) were used as anaerobic and aerobic media, respectively, after testing to ensure they supported growth. Each can was inspected for external defects. The counter tops were wiped with chlorine solution; the can-end was dipped in alcohol and held over a lighted burner. The can opener was dipped in alcohol and flamed sufficiently to destroy all microorganisms; it was used to make a hole about 2 in. in diameter in the heated end of the can. The contents of the cans were removed with sterile forceps and inoculated into one tube each of CMM and BCP. The contents, odor, and appearance were noted, and the pH

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0.5

A SURVEY OF THE OCCURRENCE OF VIBRIO PARAHAEMOLYTICUS AND V. ALGINOLYTICUS ON MUSSELS AND OYSTERS AND IN ESTUARINE WATERS IN THE NETHERLANDS

Kampelmacher, E. H., Lucretia M. van Noorle Jansen, D. A. A. Mossel, and Frieda J. Groen
Journal of Applied Bacteriology 35, No. 3, 431-438 (Sept. 1972)

Gastroenteritis caused by V. parahaemolyticus has been reported in Japan and the United States in 1971. These reports caused this survey to take place following a survey on the occurrence of the organism in fishery products sold in the Netherlands in 1970. The earlier investigation revealed that 0.25% of 407 samples of fish and crustaceans originating from the North Sea were contaminated with the organism.

Two different enrichment procedures and isolation methods in parallel were employed to obtain reliable results but the authors concluded that biochemical identification of V. parahaemolyticus "remains a difficult task." Pathogenicity tests in fertilized hen eggs [E. H. Kampelmacher and L. M. van Noorle Jansen, Zbl. Bakt. Hyg. I. (1972)] gave a more reliable diagnostic procedure. It consists of inoculating 100-500 viable cells into the yolk sac of eggs previously incubated for 10 days. Five eggs were used per assay, and the number of embryos killed within 72 hr. was used as a criterion of pathogenicity.

Of 288 samples of mussels, and 64 samples of estuarine water examined for V. parahaemolyticus 2.4% and 4.7%, respectively, were positive. The organism was not found in 80 samples of oysters. Of 144 samples of mussels, 44 of oysters, and 36

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0.5
(3.4)

AEROBIC MICROBIAL FLORA OF SMOKED SALMON

Lee, J. S., and D. K. Pfeifer (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Milk and Food Technology 46, No. 3, 143-145 (Mar. 1973)

The essentials of the good manufacturing practice (GMP) [Federal Register 35: 17401-17402. Part 128a, Subpart A. (1970)] for smoked fish are as follows: Hot smoking at 82° C. for 30 min. minimum, if the water phase salt (WPS) of the finished product is 3.5 or above; or smoking at 66° C. for 30 min. if the WPS is at least 5.0; and storage of the smoked fish at 3.3° C. maximum. This treatment is intended to remove the hazard of growth and toxin production of Clostridium botulinum type E. Before the GMP became effective, the authors investigated the microbial flora of smoked salmon from various processors.

Six smoked salmon samples were purchased from retail stores. Blended material from each sample was diluted, plated on agar, and incubated. The isolated colonies on the plates were classified in four general groups: gram-positive cocci, Bacillus, Pseudomonas, and yeasts. The gram-positive cocci were further differentiated into six groups of Staphylococcus and eight groups of Micrococcus.

The results indicated that flora and numbers of the samples were extremely variable. The aerobic bacteria count ranged from 1.3×10^2 to 2.2×10^6 per gram. In addition, the data indicated that five of the samples met the WPS requirements of the GMP at the higher temperature treatment, and three of the samples met the WPS

(over)

0.5

of water examined for V. alginolyticus, 3.5%, 6.8%, and 5.6%, respectively, were positive.

The authors concluded that V. parahaemolyticus inhabits the estuaries and sea water near the coast. In addition, they do not expect illnesses resulting from consuming raw oysters contaminated with the organism; because oysters are kept chilled from harvest to consumption, the organism, being thermotropic, will not grow to numbers that could cause illness. Mussels present no problem because they are cooked or marinated before they are eaten. The hazard lies only in recontamination after heat processing.
[4 tables, 28 references]

SW

0.5 (3.333)

0.5 PURIFICATION AND CONCENTRATION OF CLOSTRIDIUM BOTULINUM TYPE F TOXOID

These organisms were Lactobacillus plantarum, Aerobacter aerogenes, Bacillus IR3, and Streptococcus faecalis.

The authors suggest that SCE could be useful as an inexpensive source of nitrogen in microbial degradation of nitrogen deficient wastes from sulfite pulping, fruit canning, and petroleum refining. On the other hand, SCE could be used in fermentations producing crude enzymes or single-cell protein. To make SCE more usable, a reduction in volume appears necessary.
[2 tables, 9 references]

SW

0.33 PHYLOGENY OF THE NEUROHYPOPHYSIAL HORMONES. TWO NEW ACTIVE PEPTIDES ISOLATED FROM A CARTILAGINOUS FISH, SQUALUS ACANTHIAS

Acher, Roger, Jacqueline Chauvet, and Marie Therese Chauvet (Lab. Chim. Biol., Univ. Paris VI, Paris, France)
Chemical Abstracts 77, No. 25, 161099u (Dec. 18, 1972)

0.5 (3.4)

of GMP at the lower temperature treatment. The most frequently isolated microorganisms were gram-positive cocci. Pseudomonas species and yeasts were found sporadically which indicated possible contamination after processing. Bacillus species were distributed unevenly among the samples; the presence of these species could indicate underprocessing. S. aureus and S. epidermidis were found in three samples. Human skin was suggested as the origin of these species. Six strains of Micrococcus were isolated from the samples. Organisms of this genus can tolerate 20% NaCl brine but not at 3.3° C. or below specified by GMP. They also are inactivated by the smoking temperatures specified by GMP. The presence of the gram-positive cocci, the authors suggest, could be indicative of temperature abuse of the product; that is, the smoking temperatures or storage temperature specified by GMP may not have been always observed.
[4 tables, 10 references]

SW

0.5 (3.3)

of the product was measured. Then the cans were emptied, washed, and saved until incubation of cultures was complete. If cultures showed growth, the corresponding can was tested for ability to maintain a vacuum and then torn down to be examined for defects.

In almost all cases where growth occurred, either the CMM tube or the BCP tube was positive, but not both from the same sample. The organisms were found to be either species used for tests in the laboratory or cocci found on human beings.

The authors suggested that sterility tests be conducted in a room under positive air pressure by operators wearing sterile head covers, face masks, and lab jackets after having all exposed body surfaces washed with antiseptic soap.
[3 tables, 10 references]

SW

0.5 FACTORS AFFECTING SURVIVAL OF TEST BACTERIA IN SEA WATER: MARINE BACTERIA, TEST BACTERIA AND SOLID SURFACES

Moebus, K. (Biol. Anst. Helgoländ (Meeresstn.), Helgoländ, German Federal Republic
Helgoländer Wiss. Meeresunters., 23, No. 3, 271-285 (1972) 21 refs.
Aquatic Sciences & Fisheries Abstracts 3, No. 1, 3Q153M, p. 34 (Jan. 1973)

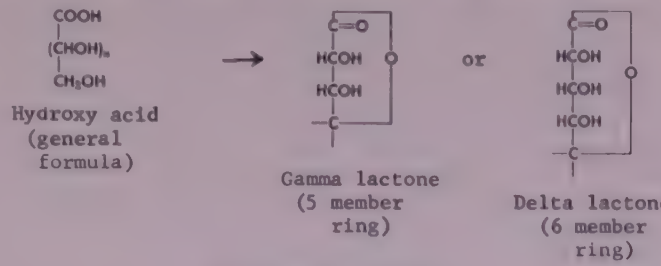
The antibacterial activity of sea water is variable relative to incubation of successive inocula of Escherichia coli, Staphylococcus aureus, and Serratia marinorubra. Incubation of second inocula was inhibited in most cases except for S. aureus. The inactivated cells of E. coli and S. aureus strengthened the bactericidal effect of filter-sterilized sea water. The bactericidal effects of autoclaved sea water were not conclusive. The bactericidal effects of sterile filtered and raw sea water were enhanced against E. coli and S. aureus on higher surface to volume ratios of solid surfaces than lower ratios. Changes in nutritive conditions were found to be more effective in the antibacterial activity of sea water than the exercises of marine bacteria.

SW

0.6 DELTA-LACTONES IN FLAVOURING

Als, Gert (Grindstedvaerket A/S Laboratory for Food Additives, Brabrand, Denmark)
Food Manufacture 48, No. 1, 31-32 (Jan. 1973)

[Hydroxy acids tend to form inner esters or lactones in the following manner:



Generalized equation Abstractor's note]

Reports from other work indicated that lactones occur naturally in fatty foods and are important in imparting flavor. Examination of various foods indicated that delta lactones are present in butterfat, beef fat, and heated pork fat, in addition to fats from other animals. The occurrence of delta lactone is due to the presence of delta hydroxy fatty acids in the triglycerides of the animal

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0.7 (5.2) THIAMINE MODIFYING PROPERTIES OF HEME PROTEINS FROM SKIPJACK TUNA, PORK, AND BEEF

Porzio, Michael A., Nora Tang, and Doris M. Hilker (Dept. of Food and Nutritional Sciences, University of Hawaii, Honolulu, HI 96822)
Journal of Agricultural and Food Chemistry 21, No. 2, 308-310 (Mar.-Apr. 1973)

Earlier work has shown that some Pacific fish contain a thermostable (non-enzymic) antithiamine activity. The present study examined the thiamine-modifying properties of heme protein fractions of skipjack tuna, beef, and pork.

The thiamine modifying factors of the dark red muscle (blood channel) of the skipjack tuna were concentrated in the protein fractions that were precipitated at 70% and 80% saturation with $(NH_4)_2SO_4$ at pH 6.8. The major constituents of these fractions were myoglobin and hemoglobin. The thiamine modifying property of the skipjack tuna myoglobin and hemoglobin was similar to that of commercial samples of equine myoglobin and bovine hemoglobin. Beef and pork also contained thiamine modifying factor that was associated with the fractions precipitated at 70% and 80% $(NH_4)_2SO_4$. Skipjack tuna light muscle showed thiamine modifying factor that was spread throughout the fractions precipitated from 30% to 80% $(NH_4)_2SO_4$ saturation. [2 figures, 2 tables, 13 references] FTP

0.6 NITRITE, NITROSAMINES AND CANCER

Aune, T. (Dept. of Pathology, Sentralsykehuset i Trondheim, Norway)
Nordisk Veterinaermedicin 24, Nos. 7/8, 356-369 (1972) (In English)
Food Science and Technology Abstracts 4, No. 12, 12C293, 11 (Dec. 1972)

Nitrites are found in various kinds of food: milk; fresh meat; flour and baked products; fresh, frozen, and canned fruits and vegetables; cheese; fresh and canned fish; smoked fish, sausages, and ham. Results of a survey of various meat products in Norway indicated that the concentrations of nitrite were relatively high. In salami, concentration of nitrites was 73.6 p.p.m., luncheon meat--76.0 p.p.m., liver pâté--20.0 p.p.m., hot dogs--14.5 p.p.m., bacon--13.0 p.p.m., and smoked salmon--130.0 p.p.m. Since carcinogenic nitrosamines can be synthesized through interaction of ingested nitrites and amines in foods or drugs, the author suggested that the addition of nitrite to food should be reduced or prohibited. The Norwegian Health Department has prohibited the use of nitrate and nitrite as additives to food after January 1, 1973, except by special permission. [47 references] SW

0.7 FAT VERSUS SUCROSE AS THE NONPROTEIN CALORIE PORTION OF THE DIET OF RATS

Dror, Yosef, Humphrey F. Sassoon, Julia J. Watson, Donald O. Mack, and B. Connor Johnson
Journal of Nutrition 103, No. 3, 342-346 (Mar. 1973)

The possibility that calories from dietary fat are metabolically superior to calories derived from carbohydrates has been discussed and investigated by other workers for many years. To find new information on the subject, diets with a ratio of protein to nonprotein calories of 1:4 were used to compare the effects of sucrose and lard on protein retention.

Three-month-old male rats were fed two different diets. One group was fed (in grams per 100 grams of diet) 69, sucrose; 5, corn oil; 20, casein; and 6, minerals plus vitamins; another group was fed a diet containing (in the same proportions) 51, lard; 8, corn oil; 33, casein; and 8, minerals plus vitamins. The two groups of rats were fed for 13 days. In the last 2 days, they were placed in metabolism cages to determine nitrogen balances.

The results of the study indicated that the rats on the lard diet had a better nitrogen economy than the rats on the sucrose diet in terms of intake, thrift, protein utilization, and energy utilization. At the end of the balance study each rat received, intravenously, radioactive L-arginine and L-leucine; groups of rats were killed 3, 12, or 24 hr. later. Measurement of the two amino acids incorporated into liver protein indicated increased L-arginine uptake in rats on the fat diet.

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0.110 SENSORY LABORATORY -- A BASIC PREREQUISITE FOR FOOD RESEARCH
(0.6)(8.8)

Neumann, R., and S. Arnold
Lebensmittel-Ind. 19, No. 9, 367-370 (1972) (In German; English summary)
Food R.A. Abstracts 26, No. 1, Abstract No. 245, 39 (Jan. 1973)

The basic requirements for a room in which taste tests are carried out are given. The article is illustrated with photographs of suitable facilities. R.A.
Reprinted

0.5 TAXONOMY OF MARINE BACTERIA: BENECKEA PARAHAEMOLYTICA AND BENECKEA ALGINOLYTICA

Baumann, Paul, Linda Baumann, and John L. Reichelt (Dept. of Microbiology, University of Hawaii, Honolulu, HI 96822)
Journal of Bacteriology 113, No. 3, 1144-1155 (Mar. 1973)

The purpose of this study was to characterize certain strains of human pathogens having the properties of the genus Beneckea and to submit the data to numerical analysis. One hundred and sixty-nine strains, including 91 strains from cases of gastroenteritis and 41 from localized tissue infections and ear and eye infections, were submitted to extensive nutritional, physiological, and morphological characterization. On the basis of phenotypic differences, the data showed that the strains could be placed into species B. parahaemolytica, B. alginolytica, and a distinct, undesignated group. Furthermore, these species and group could be separated from the other species and groups of the genus Beneckea by multiple, unrelated, phenotypic traits.
[1 figure, 3 tables, 36 references] FTP

0.6 EFFECT OF REFRIGERATIVE STORAGE AND HEAT TREATMENT ON LIPIDS IN SQUID
(1.89)

Shchenikova, N. V. (Mosk. Inst. Nar. Khoz., im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 78, No. 1, 2860q (Jan. 8, 1973)

0.6

fats. When heated or stored at room temperature, the delta hydroxy fatty acids are liberated from the triglycerides and spontaneously form delta lactones.

Synthetic delta lactones were first produced in 1952. The following lactones are now available: delta octa (C_8), nona (C_9), deca (C_{10}), undeca (C_{11}), dodeca (C_{12}), and tetradecalactone (C_{14}). These synthetic delta lactones are important for improving the odor and taste of foods that have reduced or no animal fats in their composition. The changes in the diets of the people in developed countries require less calories, more polyunsaturated fatty acids (usually of vegetable origin), and soya protein (rather than animal protein). Foods made under these conditions will require more delta lactones to enhance added flavors.
[1 table, 13 references] SW

0.6 ACCELERATORS IN FERMENTATION
(0.39)

Takeuchi, Mitsuharu, Toru Kawasaki, Yasuo Koyama, Akio Kurosawa, and Shiro Kayahara (pat.)
Japanese Patent 72/38192 (Sep. 27, 1972)
Chemical Abstracts 78, No. 1, 2765n (Jan. 8, 1973)

0.7

The authors concluded that an improved protein utilization and nutritional status was obtained in the rats when the high fat, carbohydrate-free diet was fed.
[3 tables, 24 references] SW

0.7 EFFECTS OF DIETARY PROTEIN CONTENT AND RATIO OF FAT TO CARBOHYDRATE CALORIES ON ENERGY METABOLISM AND BODY COMPOSITION OF GROWING RATS

Hartsook, E. W., T. V. Hershberger, and J. C. M. Nee (Nutritional Laboratories, Department of Animal Science, Pennsylvania State University, University Park, PA 16802)
Journal of Nutrition 103, No. 2, 167-178 (Feb. 1973)

Relationships among dietary protein, fat and carbohydrate were investigated in a modeling experiment using male rats and isocaloric diets factorially arranged to describe outcome responses of diets varying in protein content from 6 to 70% and in fat to carbohydrate calories ("ratio") from 0.2 to 1.4. Regression of body weight, weight gain and carcass dry matter, nitrogen and ash gain on protein and "ratio" was described by linear and quadratic coefficients for protein. Energy gain was optimal at 37.3% protein. Maximum quantities of heat of basal metabolism occurred at a dietary composition of 38.5% protein, 42.6% carbohydrate and 12.9% fat. Fecal and urinary nitrogen increased as dietary protein increased, but decreased as "ratio" increased. Body nitrogen gain, unaffected by "ratio," was maximal at 44% dietary protein. Digested energy and metabolized energy were unaffected by "ratio" at 40% protein, but at low and high protein, the effect of "ratio" was negative and positive, respectively. Heat production was constant at a "ratio" of 1.4; below and above 36% protein it was increased and decreased, respectively, by lower "ratios." Heat increment, unaffected by "ratio," was minimal at 46% dietary protein. Significance of this model to human and animal nutrition is discussed.
[10 figures, 7 tables, 42 references] Authors' abstract

0.8 (9.11) HANDBOOK OF OCEANOGRAPHIC ENGINEERING MATERIALS VOLUME I -- METALS AND ALLOYS

Dexter, Stephen C. (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Technical Memorandum WHOI-4-72, 89 pp. (Dec. 1972). Woods Hole Oceanographic Institution, Woods Hole, MA 02543.

This handbook of oceanographic engineering materials is limited to those materials that may be used advantageously in the marine environment. It is intended as an aid to oceanographic engineers and designers in the selection of materials. The complete handbook will cover two volumes; volume I deals with metals and alloys and volume II will deal with nonmetallic materials. Part A of this volume I contains a series of tabulations of metallic materials ranked according to selected mechanical and physical properties, corrosion resistance, and cost. Part B consists of more detailed data on each of the metals and alloys covered. These data relate to composition, mechanical and physical properties, corrosion resistance, forms available, fabricability, typical uses, and base cost. The materials are grouped into alloy classes according to the base metal of the alloy and include: aluminum alloys, copper alloys, nickel alloys, steels, stainless steels, titanium, magnesium, and zinc. FTP

0.8 (0.12) SELECTING FANS AND BLOWERS

Pollak, Robert (Bechtel, Inc., Refinery and Chemical Div., P.O. Box 3965, San Francisco, CA 94119)
Chemical Engineering 80, No. 2, 86-100 (Jan. 22, 1973)

This article describes the commercially available types of fans and blowers and indicates the factors that should be considered in their selection, maintenance, and installation. The information should be useful in the selection of the most adequate unit for a particular need.

Fans and blowers are classified as follows:

The word "fan" is intended to mean a machine that produces pressure rises up to 2 p.s.i.g. The term "blower" is used to describe a machine with pressure rise from 2 to 10 p.s.i.g. The term "compressor" is used for a machine with discharge pressures higher than 10 p.s.i.g.

Fans are classed as axial (where air or gas moves parallel to the axis of rotation) or centrifugal (where air or gas moves perpendicular to the axis). Axial-flow fans are normally used for low-resistance applications--they can move large quantities of air at low pressure. Centrifugal-flow fans are used in applications where the moving air encounters high frictional resistance. Centrifugal-flow fans are classed by blade configuration: radial, forward-curved, backward-curved or inclined, and airfoil.

Blowers are single-stage, high-speed machines, or multistage units that operate at pressures just below, or in the range of, compressors. A blower may also

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0.8 (9.19) INDUSTRIAL WATER PRETREATMENT

Seels, Frank H. (Water Management Div., Calgon Corp., Box 1346, Pittsburgh, PA 15230)
Chemical Engineering, Deskbook Issue, 80, No. 5, 27-32 (Feb. 26, 1973)

The purpose of water pretreatment is to remove selected impurities such as suspended solids and scale-causing minerals or to adjust pH before the water enters industrial operations. A knowledge of the quality of the water supply is necessary to be able to apply the correct pretreatment techniques. A description of the basic forms of pretreatment follow.

Clarification is a form of pretreatment which involves removal of color and suspended solids from water. When chemical coagulants are used in pretreatment, limits on water velocity and turbulence are required. Lime softening (softening by chemical precipitation) is a pretreatment that removes calcium, magnesium, and bicarbonate ions. This step can be combined with clarification to remove the precipitates. Depending on the amounts of iron and manganese in the water supply, these ions may require special treatment for removal. If the amounts are below 0.5 p.p.m., lime softening is able to remove them.

Chlorination is a pretreatment useful in oxidizing organic material before water enters the clarification step. Chlorination before filtration of water prevents organisms from fouling the filter bed. Chlorination after filtration protects the water distribution system from organisms that could cause corrosion.

Filtration follows clarification and other treatment processes to remove any remaining solids.

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0.9 (9.3) THE ROLE OF BASIC RESEARCH IN THE TOTAL R & D PROCESS

Bryan, Glen L. (Psychological Sciences Div., Office of Naval Research, Washington, D.C.)
Research Management 16, No. 1, 29-33 (Jan. 1973)

The role of basic research and the nature of its contributions to the research, development, test, and evaluation (RDT & E) processes depend upon the organizational pattern of the total research and development (R & D) system. In this paper, the author differentiates five different descriptive models of the RDT & E process and indicates the type of contribution that basic research is called upon to make in each model. These models are found in the Department of Defense, but some of them might be found in industrial R & D operations.

Of the five organizational systems analyzed, the author believes the organic model offers the best environment. The organic model is symbolized by the sketch of a tree; the tree was selected simply because it is a living organism. Therefore, there exists a dynamic equilibrium and mutual dependence among its component parts. Each component part has a specialized function, and it cannot substitute for another part. Furthermore, each component part is vital to the vigor and productivity of the entire organism. Fundamental research is represented by the roots of the tree; the roots of the tree provide the basis for the whole tree. Also, because the roots come before the rest of the tree, they have to exist before the rest of the tree does. For these and other obvious reasons, the author draws a parallel between the role of the roots of a tree and the role of basic research.

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0.8 (0.12)

be a rotary (positive-displacement) compressor that can handle relatively low air flows at high compression ratios.

Reprints of this report are available at a price of $2.00 per copy. Request for reprints should be addressed to Chemical Engineering, International Data Processing Center, 121 South Gertrude Ave., Paramus, NJ 07652, U.S.A. Refer to Reader Service Number 173.

[19 figures, 4 tables, 15 references] FTP

0.39 IMPORTANCE OF PURINE METABOLISM IN UREA BIOSYNTHESIS IN CARP (CYPRINUS CARPIO) (1.92)

Vellas, F., Y. Creach, and M. Dassain (Lab. Ecophysiol. Anim., Univ. Paul-Sabatier, Toulouse, France)

Chemical Abstracts 78, No. 1, 2167u (Jan. 8, 1973)

0.8 (9.3)

The organic model does not have the strictness of a production chart, but it does emphasize the interactive and interdependent nature of RDT & E. It admits, too, that every really important problem should be worked on at all RDT & E levels simultaneously. The organic model has the greatest flexibility and the greatest opportunity for fundamental research to prosper.

[6 figures] FTP

0.8 (9.16) EVAPORATION CONTROL ON WATER RESERVOIRS

Dressler, Russell G. (Trinity University, San Antionio, TX 78212), and E. Guinat (Shamtan Lubricants and Chemicals, L.T.D., Tel-Aviv, Israel)

Product R & D 12, No. 1, 80-82 (Mar. 1973)

Scientists have been seeking a practical method for applying monomolecular films to reservoirs in order to control evaporation of water. A patent (U.S. No. 2,903,330) discloses the application of C_{12}-C_{20} fatty alcohols on reservoir surfaces in the form of aqueous suspensions or emulsions, with or without emulsifying or suspending agents. The present report contains descriptions of the suspension process for applying films, development of the equipment, small and large scale trials in the United States, and demonstration trials in Israel. The report covers design of equipment and the procedure for full-scale application of monomolecular films by the suspension process on two lakes of 200-700 acres in Israel. The objectives were to determine the general feasibility of the method, and the critical wind speeds and other factors that may affect or disrupt the continuous film cover. It was possible to maintain a high degree of film coverage for long periods. On a lake of 700 acres, the critical wind speed was 15.5 m.p.h. (above which it is unfeasible to maintain the lake cover).

[18 references] FTP

0.8 (9.19)

Adsorption removes dissolved organic materials principally through the use of activated carbon. It also dechlorinates the water before entering an ion exchange unit which could be damaged by chlorine residues.

Reverse osmosis may be used for desalting sea water. The process uses pressure to force raw water through a semipermeable membrane of a selected pore size. It is possible to remove molecules from the water that are larger than the membrane pore.

All of these water treatments accumulate residues of spent chemicals or clogged filters which may be highly acid or alkiline and persistent and may present problems of disposal without damage to the environment.

[6 figures, 2 tables, 14 references] SW

0.9 (9.3) GEARING INDUSTRIAL R & D TO THE CHALLENGES OF THE 70'S

Anderson, Charles A. (Stanford Research Institute)
Research Management 16, No. 1, 6-9 (Jan. 1973)

Actions taken at the national level to revitalize industrial research have lacked the scope and committment needed to solve our present and long-term problems. However, economic realities are creating a growing awareness of the vital importance of maintaining our technological lead, and broad societal problems have emphasized the need for more technology. The author believes that our government should take steps to improve the climate for R & D, and he suggests some initiatives and approaches that might be taken. These are: (1) Create a system of tax incentives to encourage increased investments in R & D, (2) Relax antitrust prohibitions against appropriate forms of cooperation in R & D, and (3) Contract directly with industry for the R & D needed to solve major national problems. He believes that the government will create a scientific-industrial complex that will make possible achievements in other fields equal to those of our space program.

FTP

0.9 (9.7) MEASURING THE PERFORMANCE OF RESEARCHERS

Edwards, Shirley A., and Michael W. McCarrey (Organizational Psychology Research Division, Personnel Psychology Service and Research Centre, Public Service Commission, Ottawa, Canada)
Research Management 16, No. 1, 34-41 (Jan. 1973)

A review was made of studies on the measurement of scientific performance. Little agreement exists as to what constitutes scientific output or as to what measures should be used as an index of the output. The few in-depth studies of scientific performance revealed that scientific output is multidimensional and cannot be satisfactorily measured by any one criterion alone. Some of the unresolved questions relating to measures of scientific performance are: (1) Are authors' positions of any value in determining a scientist's written output? (2) How should the quality of a scientist's work be measured; what is the relationship between quality and quantity? (3) What is the value of citation counts? (4) In what way does the creativity or originality of a scientist's work relate to other measures?

For the evaluation of scientific performance, there is need for more intensive investigations into the nature of scientists' contributions to their organizations and to their professions, and also to the scientific community at large.
[52 references]

FTP

0.9 WHERE R & D MANAGEMENT DEVELOPMENT HAS FAILED

Moore, Richard F. (Microelectronics Division, National Cash Register Co.)
Research Management 16, No. 1, 22-25 (Jan. 1973)

The author states that management training and development in industrial R & D organizations is largely a mirage. In his opinion the average new R & D manager, and some experienced managers, are characterized as follows: (1) undertrained in the philosphy and operating principles of management, (2) underdelegated relative to authority, (3) overstretched span of accountability, (4) represented frequently as the best technical expertise in the group, and (5) confused as to how to use the output of the behavioral sciences. Ten areas in which improvements are needed are: (1) Expanded effort must be brought to bear in the study of human resource management; (2) Project successes and failures should be analyzed for common and uncommon denominators in order to adjust the management environment as necessary; (3) Management profiles of the strengths and weaknesses of key, young managers, require further study as a basis for the organization of self-development programs; (4) To improve communication and understanding, management development specialists should be assigned in a staff capacity to the line managers for a period of time prior to joining the management development staff; (5) Improved communication of work environment, responsibilities, and accountabilities to wives of managers are needed; (6) A new look should be taken at techniques for slowing the accelerating technical obsolescence of managers; (7) The concept of key manager job rotation internal and external to R & D should be exploited as a source of managers with broad perspectives; (8) Regular, off-site peer management learning groups should be

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1.013 AN EVALUATION OF THE PRESENT LEVELS OF EXPLOITATION OF THE FISHERY RESOURCES OF VENEZUELA

Griffiths, Raymond C., and John G. Simpson
Serie Recursos y Explotacion Pesqueros 2, No. 5, 52 pp. (1972) (Ministerio de Agricultura y Cría, Oficina Nacional de Pesca, República de Venezuela, Caracas, Venezuela) [In Spanish and in English]

The fishery resources off Venezuela are described based on information collected during the past 5 years by the Ministry of Agriculture/United Nations Development Program/Food and Agriculture Organization Fisheries Development Project. Present catch levels and recent historical trends in the catches of the most important species or groups of species are discussed. Also, preliminary stock assessments were made for those fisheries in which adequate data were available on fishing effort.

The sardine fishery seems to be stabilized at about an annual catch of 40,000 tons. The trawl fisheries has about reached the level of maximum sustainable yields; this fishery includes predominantly the shrimps, grunts, curvinas, and croakers. The yellowfin and albacore tuna are probably being overfished. The rest of the resources are being exploited by the artisanal fisheries and probably could be further developed.
[1 figure, 23 tables, 46 references]

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(9.2)

CONTROLLING STAFF AGE, AND FLEXIBLE RETIREMENT PLANS

Decker, W. D., and C. M. Van Atta (Lawrence Livermore Laboratory, University of California)
Research Management 16, No. 1, 16-21 (Jan. 1973)

The authors state that average age and age distribution importantly affect the vitality and output of an R & D staff. They suggest effective turnover practices and a flexible early retirement plan to help produce a desirable age mix.

Results of their review of the literature and interviews with responsible research managers revealed that: (1) Creativity generally diminishes after the age of 35 or 40; (2) Total value of an individual to the organization may continue to improve due to experience and judgement; and (3) Persons with leadership potential move into management positions and are subsequently judged in that role. However, performance and responsiveness of aging professional employees varies over a wide range so that flexibility in management (rather than fixed rules) is required. Given a stimulating atmosphere, highly movitated professional employees generally maintain their creativity and productivity up to the normal retirement age.

A successful, flexible retirement plan should provide for 60% of the average high-three year salary for 30 years of service. However, the annuity as a percentage of the average high-three salary should increase only slowly with each year of service--between 2 and 2.5% per year. Such a plan would provide an adequate annuity for most employees retiring at age 55 and little incentive for late retirement for the marginal employee.

[5 figures, 3 tables, 4 references] FTP

1.121

[ALBACORE FISHING IN (THE) ATLANTIC]
LA PÊCHE A L'ALBACORE DANS L'ATLANTIQUE

Fonteneau, A. (ORSTOM, Abidjan, Ivory Coast, Africa)
Fr. Pêche, 173, pp. 36-39 (1972) (In French)
Aquatic Sciences & Fisheries Abstracts 3, No. 1, 3Q819M, p. 181 (Jan. 1973)

The present state and prospects for the Atlantic albacore fishery were evaluated. Yield of fish is falling in contrast to greatly increased fishing effort over the last 3 years by large French, Spanish, and American seiners. Younger fish are caught in the increased effort. It was shown that yields would be increased if fish below 2 years old and adults were not caught. These actions would allow more recruits to enter the fishery. Quota systems to limit catch size and minimum fish size limit would increase fish population. Exploitation of other species could allow expansion of the fishery. SW

0.9

TECHNICIANS AND SUPPORT PERSONNEL -- HOW MANY?

Cuthbert, F. L., and S. Blinder (Research and Development, NL Laboratories, Inc.)
Research Management 16, No. 1, 26-28 (Jan. 1973)

Technicians and support personnel are a vital part of a research organization. Having the right number of such personnel in relation to the size of the professional staff has a bearing on how efficiently the organization operates. The optimum ratio of professionals to nonprofessionals must be resolved by each research manager to meet his own particular requirements. The authors made a study of the distribution of personnel in the three job function categories (professionals, technicians, support personnel) in 92 industrial companies. Such information on what is typical in R & D organizations may be of value to the research manager. Data on the ratios of professionals to nonprofessionals in all the companies surveyed and in three selected industrial categories are given in the table that follows.

Industry	Ratio of professional to technicians (Median)	Ratio of professionals and technicians to support personnel (Median)
All 92 companies	1.205	3.725
Chemicals & allied products (24 companies)	1.33	4.065
Petroleum refining (13 companies)	1.31	3.00
Primary metals (10 companies)	1.015	4.505

2 figures, 3 tables] FTP

0.9

extended as a means for cross fertilization of problem oriented management; (9) Industrial and academic science groups should seek to achieve a closer mutual understanding of management problems and areas of need; and (10) Examine the feasibility of individual managers playing a direct role in periodically modifying their own position descriptions.

[2 references] FTP

2.05 TOXICITY OF HALOGENATED OXYQUINOLINES TO DOGS. EFFECT OF FEEDING FOULED HERRING

Lannek, Birgitta, Paul Lindberg (Med. Dep. I, R. Vet. Coll., Stockholm, Sweden) Chemical Abstracts 78, No. 1, 1037q (Jan. 8, 1973)

1.951 DISTRIBUTION AND ABUNDANCE OF NEW ZEALAND FUR SEALS ON THE SNARES ISLANDS, NEW ZEALAND

Crawley, M. C. (Zoology Dept., University of Canterbury, Ilam, Christchurch, New Zealand)
New Zealand Journal of Marine and Freshwater Research 6, Nos. 1-2, 115-126 (June 1972)

New Zealand fur seals were once abundant on the rocky shores of New Zealand and the sub-Antarctic Islands, but in the early 19th century commercial sealing almost exterminated the herds. The New Zealand Government regulated, sporadically, the taking of the remaining animals from 1875 to 1946. Since then no seals have been killed legally. Under protection, the seals are thought to be increasing. To determine the distribution and abundance of seals, studies were carried out by the 1970-71 University of Canterbury Snares Islands Expedition.

There were 1,156 seals, excluding pups, on the main island counted in late November 1970. The greatest number of seals on the shore were counted between the hours 1200 and 1500 daily.

Rookeries were widely but discontinuously distributed only on the boulder beaches of the west and southwest coasts of the main island. Breeding bulls defended territories containing, on the average, three females. The first pup was seen on November 30, and when pupping appeared to end, there were 234 pups counted on December 30, 1970.

Nonbreeding seals gathered on rocky headlands, points, and spurs mainly on the east coast of the main island.

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2.01 (0.5) VOLATILE COMPOUNDS PRODUCED IN STERILE FISH MUSCLE (SEBASTES MELANOPS) BY PSEUDOMONAS PEROLENS

Miller, A., III, R. A. Scanlan, J. S. Lee, L. M. Libbey, and M. E. Morgan (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Applied Microbiology 25, No. 2, 257-261 (Feb. 1973)

Earlier, various research workers described a musty, potatolike odor arising from chilled fish muscle during the early stages of spoilage. The organism causing the odor was P. perolens, a psychrophilic organism. The purpose of the present study was to identify the volatile compounds produced in sterile fish (black rockfish, S. melanops) muscle by P. perolens. Of particular interest were the compounds that were responsible for the musty, potatolike odor.

The volatile compounds were identified by use of combined gas-liquid chromatography and mass spectrometry. The compounds positively identified were: methyl mercaptan, dimethyl disulfide, dimethyl trisulfide, 3-methyl-1-butanol, butanone, and 2-methoxy-3-isopropylpyrazine. The compounds identified tentatively were: 1-penten-3-ol and 2-methoxy-3-sec-butylpyrazine. The compound that was found to be primarily responsible for the musty, potatolike odor produced by P. perolens was 2-methoxy-3-isopropylpyrazine.

[3 figures, 24 references] FTP

1.951 PINNIPEDS OF THE NORTH PACIFIC

Arsen'ev, V. A. (All-Union Research Institute of Marine Fisheries and Oceanography, U.S.S.R.), and K. I. Panin
Israel Program for Scientific Translations, Jerusalem, Israel (1971), 274 pp. (Translated from Russian)

In 1957 the U.S.S.R., the United States, Canada, and Japan entered into an agreement called Convention for the Conservation of the North Pacific Fur Seal. This agreement regulated the catch of the fur seal and established a commission to coordinate research programs of the party nations. The purpose of the research is to maintain optimum population with maximum permissible exploitation. The 1957 convention was instrumental in restoring the herds of seal that had been nearly exterminated in the North Pacific.

The research efforts established by the convention were originally reported in 10 different Russian publications. In the field of biology, articles include population dynamics, determination of stocks, and morphology of fur and other seals. Other articles cover damage caused by sea lions and data on depleted sea otters. In addition, there are articles on primary processing of seal skins, and methods of increasing the value of the product. SW

2.1121 DESIGN OF TRAWLS: PART 5. BEAM TRAWLS

Buckingham, Harry
World Fishing 22, No. 2, 48-49 (Feb. 1973)

The beam trawl was commonly used in the last century for inshore fishing by sailing smacks. The low-water resistance of the beam trawl made it possible to be towed by sail powered vessels. The introduction of steam power and the otter trawl caused the beam trawl to be confined to small inshore boats fishing for shrimp and flatfish.

The beam trawl is fixed in the open position by a heavy, wide frame. The size of the beam can vary relative to vessel characteristics and depth to be fished. Because this gear is so heavy, it sinks quickly and stays on the bottom. The Belgian and Dutch fishermen have adapted it to modern, powerful fishing vessels, towing a trawl from both sides, "double rig." Double-rig fishing is hazardous, because it can cause a boat to broach-to in a strong wind or tide before compensating adjustments can be applied to rigging arrangements.

The beam trawl design presented in the article is 20 ft. in length with a 70 mm. mesh net, for fishing mainly for sole. The plans for the net sections and the rigging are provided with directions for fabrication of the parts.

[3 diagrams, 1 photograph] SW

2.110 UNDERWATER PHOTOGRAPHY IN FISHERIES RESEARCH

Hemmings, C. C. (Marine Laboratory, Aberdeen, Scotland)
Journal du Conseil 34, No. 3, 466-484 (Oct. 1972) (Copenhagen, Denmark)

Underwater photography has been used as a tool in fisheries research for the past 25 years. However, the information on the action of gear and fish tends to be provided by acoustic instrumentation. The fundamental requirement for photography is that light radiating from the object be of an intensity and within a spectrum that can cause an adequate response on the film emulsion. Sunlight is attenuated by absorption and scattering in water, and photography by natural light is almost impossible at depths below 30 m. The attenuation of contrast with increased depth and distance from the object prevent the making of a clear photograph. The solution to the problem is the selection of films with light characteristics that will increase contrast with the available light.

The article covers the problems of contrast, illumination, optical distortion, camera mounting, and photographic information content, with references.

The author suggests that trials of cameras and other equipment should be performed in shallow water to familiarize the photographer with the capabilities and problems of underwater photography.
[8 figures, 1 table, 32 references] SW

2.1128 PLASTIC LOBSTER TRAP

Jalbert, Donald A. (137 N.E. Washington St., Barthlesville, Okla.) (pat.)
U.S. Patent 3,708,905
Official Gazette of the U.S. Patent Office 906, No. 2, 397 (Jan. 9, 1973)

The lobster trap is formed by six planar panels, which consist of plastic frames having spaced plastic strips mounted thereon. FTP

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These counts made during the expedition can now be used as a reference for comparison with future abundance studies. If the herds increase, interest in the possibility of fur seal harvest may increase, and managing bodies will have sound estimates of population based on these counts.
[2 figures, 2 tables, 19 references] SW

2.06 PRODUCTION OF FISHERIES PRODUCTS

Ronsivalli, Louis J., Lawrence Learson, and Robert J. Learson; assignors to the United States of America (pat.)
U.S. Patent 3,712,821 (Jan. 23, 1973)

Presently undesirable species of fish, shellfish and crustaceans and process-degraded flesh fractions therefrom are reconstituted to form a highly desirable food product having characteristics of natural fisheries products. These reconstituted products will withstand heat sterilization, refrigerated storage, and subsequent cooking without crumbling. Authors' abstract

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2.114 (2.118) INSTALLATION FOR THE PRESERVATION OF FISH ESPECIALLY ON BOARD FISHING BOATS

Regnier, Paul (Dieppe, France); assignor to Ateliers & Chantier de la Manche, Dieppe, France (pat.)
U.S. Patent 3,717,123
Official Gazette of the U.S. Patent Office 907, No. 3, 677 (Feb. 20, 1973)

This is a refrigerated brine system for preserving fish. It is equipped with a heat exchanger to cool the liquid, a device to circulate the brine, and a filter to remove fish scales and other solid foreign matter. FTP

2.1471 (2.1475) ARE FISH EXHAUSTED DURING TRAWL AND SEINE NET CAPTURE?

Wardle, C. S.
Scottish Fisheries Bulletin No. 38, pp. 14-18 (Dec. 1972). Her Majesty's Stationery Office at HMSO Press, Edinburgh, Scotland. Price not given.

The reaction of fish to the presence of fishing gear such as trawls or seines is important to capture techniques. In other reports of seine net operations divers observed how the fish are herded into the pathway of the net. The fish swim forward keeping station with the wings of the net until, during the fast haul, they turn around and swim back into the funnel of the net. At this stage some fish will turn again and swim with the net before finally falling back.

Experiments were performed to determine fish swimming speed and endurance relative to optimizing fishing gear techniques. In a sea-water tank, 30 feet in diameter, a group of cod, haddock, and saithe were induced to swim for 102 hours at 2 knots, a distance of 204 nautical miles. It was found that the fish will swim, for long periods of time, at any speed up to twice their own body length per second; for a fish 20 inches long the speed is 2 knots. However, when the fish were induced to swim at higher speeds their endurance was immediately limited. For a 20-inch fish, speeds between 7-10 knots could be induced, but the endurance was limited to less than 1,000 feet. Different muscle systems are used by fish for swimming at 2 knots or less and for swimming at higher speeds. Below 2 knots an aerobic energy utilization system is used. When the speed is increased the other muscle system is used which operates on anaerobic energy conversion with a limited fuel supply (glycogen). The replenishment of this system takes up to 24 hours.

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2.12 (2.1471) DESIGN AND EVALUATION OF A SAMPLER FOR MEASURING THE NEAR-BOTTOM VERTICAL DISTRIBUTION OF PINK SHRIMP, PANDALUS JORDANI

Beardsley, Alan J. (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, WA 98102)
Fishery Bulletin 71, No. 1, 243-253 (Jan. 1973)

A shrimp sampler was constructed as one portion of a research effort dealing with the development of a fish-shrimp separator trawl. The sampler segregated shrimp caught in a series of 1-ft high vertical openings positioned between the seabed and a height of 13 ft above the seabed. Knowledge of the vertical distribution of shrimp was considered essential in the design of an efficient shrimp trawl. Results indicated that vertical distributions of shrimp vary, and the amount of light striking the seabed is suggested as the triggering stimulus. Auxiliary investigations conducted with the sampler dealt with evaluations of mesh size and tickler chain. Experiments indicated that mesh sizes smaller than 2 inches restrict the passage of shrimp. The weight of shrimp caught was nearly doubled when a tickler chain was used. The sampler may have application to both shrimp biologists and commercial fishermen.
[8 figures, 5 tables, 11 references] Author's abstract

2.3 METHOD FOR REMOVING MEAT FROM THE SHELLS OF BIVALVE MOLLUSKS

Hanks, Fletcher (P.O. Box 70, Easton, Md.) (pat.)
U.S. Patent 3,722,035
Official Gazette of the U.S. Patent Office 908, No. 4, 801 (Mar. 27, 1973)

Clams, which had been heated sufficiently to partially open their shells and to effect withdrawal of one end of the adductor muscle from the shell, are dropped into a body of water. Compressed air is introduced at the lower portion of the body of water. The clam meats are separated from the shell; the meats rise toward the surface and the shells sink to the bottom. The meats and shells are removed by individual conveyors extending into the body of water. FTP

2.1473 MARINE HAULING APPARATUS

Whipple, William D., and Howard W. Gifford; assignors to Prelude Corp., Westport Point, Mass. (pat.)
U.S. Patent 3,722,126
Official Gazette of the U.S. Patent Office, 908, No. 4, 824 (Mar. 27, 1973)

The device is used aboard vessel to haul a trawl [longline ?] of marine life-harvesting equipment using a pulleylike unit. FTP

2.3 (9.15) METHOD AND APPARATUS FOR REMOVING WORMS AND PARASITES FROM THE FLESH OF FISH

Schmader, Joseph M. (Hunts Point Rd., Cape Elizabeth, ME 04107) (pat.)
U.S. Patent 3,720,981 (Mar. 20, 1973)

The apparatus is used to remove worms and parasites from the fillets of fish that may be infested with such materials. The fillets are held against a light source to render the worms or parasites visible. The objects are then removed by inserting a cannula in the infected area and withdrawing the worm or parasite by suction. FTP

2.3 METHOD OF FORMING A CONTINUOUS ADHERENT BATTER ON A FOODPIECE

Fischer, Leonard G., Monroe B. Sherain, Nancy A. Cornacchio, Bernard J. Entner, and Ferdinand E. Pettinato; assignors to DCA Food Industries Inc., New York, N.Y. (pat.)
U.S. Patent 3,723,137
Official Gazette of the U.S. Patent Office 908, No. 4, 1080 (Mar. 27, 1973)

This is a process for applying a driples batter to a piece of food. FTP

2.114 FISH NET RETRIEVAL APPARATUS

Hatley, Lowell J. (5452 - 40th Ave., West, Seattle, Wash.) (pat.)
U.S. Patent 3,707,799
Official Gazette of the U.S. Patent Office 906, No. 1, 113 (Jan. 2, 1973)

The apparatus has an endless belt running around two spaced-apart spools or drums. Power is applied to the drums and belt for reeling in the fishing net. FTP

2.1471 (2.1475)

Thus the endurance of the fish is limited at speeds above 2 knots and leaves the fish exhausted for a long time relative to the short period of the capture process. In practical terms, when the fish is made to swim at higher, exhausting speeds, it moves away from the device that is inducing it to swim and will seek an alternative route that will allow it to swim at less than 2 knots. The 20-inch cod swim 2,000 feet stationed in front of the footrope of the trawl at 4 knots, but then it will seek a new, slower route. In this case, it will turn and swim down the funnel of the net. A 3-foot cod is just large enough to swim for an unlimited period in front of the net and maintain a supply of fast swimming fuel. This size fish, and larger, may accumulate in front of trawls and swim away after the net is made ready to be brought to the surface. Operation of trawls and seines should be based upon this knowledge of fish behavior.
[1 figure, 1 table] SW

2.113 ANTIFOULING PAINT FOR SHIPS', BOTTOMS AND UNDERWATER STRUCTURES

Fujimura, Hitoshi, Yoshio Nose, and Kanazawa Teiichi (Kumiai Chemical Industry Co. Ltd.) (pat.)
British Patent 1,296,814 (Nov. 22, 1972)
Chemical Abstracts 78, No. 8, 45185r (Feb. 26, 1973)

2.3 WASTE WATER DRYER

Nakamura, Yoshinosuke (Tanaka Mach. Co., Ltd., Osaka, Japan)
Chemical Abstracts 78, No. 8, 45449e (Feb. 26, 1973)

4.13 (8.53)

PHOSPHOLIPIDS OF MARINE ORIGIN. VI. THE OCTOPUS (OCTOPUS VULGARIS)

De Konig, A. J. (Univ. of Botswana, Lesotho and Swaziland, Roma, Lesotho, Africa)
Journal of the Science of Food and Agriculture 23, No. 12, 1471-1475 (Dec. 1972)

This study of the phospholipids of the octopus was undertaken because little information is available on the particular subject. The composition of the phospholipids was determined by analysis of hydrolytic breakdown products and by chromatography on silicic acid. According to the author, the most remarkable feature of the phospholipids of the octopus was the high level of ceramide aminoethylphosphonic acid. Also, the octopus was a rich source of ciliatine, containing more than twice that in the abalone. Some pertinent data are given in the tables that follow.

Class of compounds	Composition of octopus phospholipids as % of total phospholipids (avg.)
Cardiolipins plus neutral lipids	3
Phosphatidylethanolamine	30
Phosphatidylserine	5
Ceramide aminoethylphosphonic acid	13
Phosphatidylinositol	4
Phosphatidylcholine	42
Sphingomyelin	3

(over)

6.190

A REVIEW OF THE CHEMICAL AND NUTRITIVE PROPERTIES OF CONDENSED FISH SOLUBLES

Soares, Joseph, Jr., David Miller, Susan Cuppett, and Paul Bauersfeld, Jr. (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Fishery Bulletin 71, No. 1, 255-265 (Jan. 1973)

This paper is a review of some of the pertinent data available on the chemical and nutritive properties of condensed fish solubles with special reference to condensed menhaden solubles. Information concerning other kinds of fish solubles from various published sources is tabulated for comparison. The results of three analytical and three biological studies of menhaden solubles are reported.

Data show that menhaden stickwater contains an average of 4.8% protein, 93.4% water, and about 1.25% lipid. The solids are concentrated about seven times by vacuum evaporation to yield condensed solubles. Data show that this product contains about 32% protein, 49% water, and 11% fat. Additional data are presented on the content of amino acids in fish solubles, which show that the indispensable amino acid tryptophan is relatively low and, on the content of essential inorganic elements which are shown to be present, generally in acceptable levels. Fish solubles are shown to be rich sources of choline, niacin, pantothenic acid, riboflavin, biotin, and vitamin B_{12}.

An experiment with broiler chicks showed that the average metabolizable energy content of 10 samples of condensed menhaden solubles from commercial plants located along the Atlantic and Gulf coasts was 2.03 kcal/g on an "as fed" basis. Average protein and fat digestibility was 89 and 57%, respectively.

(over)

4.13 (8.53)

A NEW STEROIDAL SULFATE OBTAINED FROM A STARFISH SAPONIN, ASTEROSAPONIN A

Ikegami, Susumi, Yuji Kamiya, and Saburo Tamura (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Tetrahedron Letters No. 10, 731-734 (Mar. 1973)

In 1965, T. Yasumoto and Y. Hashimoto [Agr. Biol. Chem. 29, 804 (1965)] isolated a toxic saponin, asterosaponin A (I), from the starfish; it contains a steroidal aglycone to which two moles each of 6-deoxy-D-galactose and 6-deoxy-D-glucose and a mole of sulfuric acid are attached. Later, the present authors showed that I was a spawning inhibitor to the starfish and established the structure of its main aglycone as 3β,6α-dihydroxy-5α-pregn-9(11)-en-20-one.

In the present study, the authors isolated from I a novel steroidal sulfate and established its structure as 6α-hydroxy-3β-sulfo-oxy-5α-pregn-9(11)-en-20-one. [9 references] FTP

6.31

NITROGEN METABOLISM OF AQUATIC ORGANISMS. II. THE ASSIMILATION OF NITRATE, NITRITE, AND AMMONIA BY BIDDULPHIA AURITA

Lui, Nan S. T., and Oswald A. Roels (Biological Oceanography, Lamont-Doherty Geological Observatory of Columbia University, Palisades, NY 10964)
Journal of Phycology 8, No. 3, 259-264 (1972)

Relatively little is known about the general principles of nitrogen assimilation in marine algae. Better knowledge of the nitrogen metabolism of marine phytoplankton would provide a basis for predicting the effects of nitrogen enrichment or depletion on phytoplankton stocks. By determining the preferential use of various forms of nitrogen by phytoplankton and of the nature and control of nitrogen uptake, assimilation, and cellular function, we will increase our understanding of the marine food chains. Diatoms are one of the most important groups of marine phytoplankton; the centric marine diatom B. aurita is widely distributed throughout the world's oceans. In this study, the authors examined the uptake and metabolism of nitrate, nitrite, and ammonia, the activities of nitrate- and nitrite-reducing enzymes, and the adaptation of these enzymes to different nutritional conditions.

B. aurita can use nitrate, nitrite, or ammonia as its sole source of nitrogen. The cells remove ammonium nitrogen from the medium 2.3 to 2.4 times as fast as they remove nitrate or nitrite nitrogen. When the cells are grown for 24 hr. in ammonium medium, they contain higher levels of nonprotein nitrogen than when they are grown in nitrate or nitrite medium for the same period of time.

(over)

4.5 STUDIES ON THE TOXICITY OF THE AUTOXIDIZED OILS.
II. THE EFFECTS OF AUTOXIDIZED OILS ON THE ENZYMIC ACTIVITIES

Yoshioka, Masako, Katsuhisa Suzuki, and Takashi Kaneda (Dept. of Food Chemistry, Faculty of Agriculture, Tohoku University, Tsutsumi-dori, Amemiya, Sendai, Japan)

Journal of the Japan Oil Chemists' Society 21, No. 12, 881-887 (1972) [In Japanese; abstract in English]

Studies were performed to determine the effects of autoxidized oil on enzyme activity in vitro relative to toxicity to mice. Safflower oil at various stages of autoxidation was incubated with the following enzymes: a lipase, pepsin, papain, or cytochrome c. The results indicated that enzymes incubated with the oil that was the most autoxidized had the least activity. Only pepsin was not affected. Reduction of enzyme activity correlated well with increased toxicity of the oil for mice.

The autoxidized oil was fractionated to isolate the agent that caused inhibition of enzyme activity. The fractions were (1) low molecular weight compounds, (2) free fatty acids, and (3) other monomeric and polymeric compounds. The fractions were incubated with the enzymes to determine effects on activities. The low molecular weight compounds fraction was found to be most inhibitory of enzyme activity and was most toxic to mice.

[6 figures, 14 tables, 19 references] SW

6.31

The nitrogenous compounds in the nonprotein nitrogen fraction from cells grown in each of the three media contain the same level of soluble-free amino nitrogen, combined amino nitrogen, and ammonium nitrogen. B. aurita cells grown in nitrate medium have nitrate- and nitrite-reductase activity; those grown in nitrite medium have nitrite-reductase activity; and those grown in the ammonium medium lack both enzymes.

[3 figures, 4 tables, 23 references] FTP

6.15 COMPOSITION AND NUTRITIVE VALUE OF FISH SOLUBLES

Buraczewska, Lucyna, Stanislaw Buraczewski, Stefania Lubaszewska, Barbara Pastuszewska, and Teresa Zebrowska (Inst. Anim. Physiol. Nutr., Jabłonna/Warsaw, Poland)

Chemical Abstracts 77, No. 17, 112858g (Oct. 23, 1972)

4.13 (8.53)

Fatty acid	Fatty acid distribution as % of total fatty acid methyl esters [1]	
	Octopus phospholipids	Octopus nonphosphorylated lipids
14:0	2	6
16:0	24	23
16:1	--	4
17:0	1	1
16:2	1	1
18:0	10	15
18:1	4	23
18:2	--	1
20:1	4	3
20:4	7	3
22:1 (?)	2	--
20:5	18	7
22:4	1	--
22:5	2	1
22:6	23	9

[1] Values lower than one were omitted.

[1 figure, 3 tables, 9 references] FTP

6.190

Further studies with broiler chicks showed that significant unidentified growth factor responses could be obtained when 5% menhaden solubles was used in diets. A significant response was obtained even when the chicks were reared in a gnotobiotic environment. This indicates that the presence of bacteria is not necessary for solubles to produce a growth response in chicks.

[11 tables, 42 references] Authors' abstract

6.10 USE OF PLANT EXTRACTS AS ANTIOXIDANTS IN THE PRODUCTION OF FISH MEAL

Witas, Tadeusz (Szczecin, Poland)

Chemical Abstracts 77, No. 25, 163119z (Dec. 18, 1972)

6.31 HARVEST AND REGROWTH OF TURTLE GRASS (THALASSIA TESTUDINUM) IN TAMPA BAY, FLORIDA

Taylor, John L., Carl H. Saloman, and Kenneth W. Prest, Jr. (Gulf Coastal Fisheries Center, National Marine Fisheries Service, NOAA, St. Petersburg Beach, FL 33706)
Fishery Bulletin 71, No. 1, 145-148 (Jan. 1973).

One of the environmental catastrophes to occur in the past 30 years is the destruction of vast beds of turtle grass through dredge-fill operations, other types of coastal engineering,and pollution in its many forms. The most recent development that may affect turtle grass is the possibility of its harvest for use as a food supplement for livestock. Earlier work has shown that turtle grass leaves contain about 13% protein, and that turtle grass in pellet form significantly increased the weight gain and feed utilization of experimental sheep over that of control animals when added to normal rations as a replacement for alfalfa at a level of about 10%. One of the many questions raised by the success of these feeding trials is whether or not beds of turtle grass can survive and regrow after harvest. This report presents results of a study in which leaves in an experimental plot of turtle grass were repeatedly cut, measured, and compared with those taken from a control area between August 1968 and November 1969.

A comparison of leaf growth and new leaf production in plots of cut and uncut turtle grass, Thalassia testudinum, indicated that plants suffered no damage when harvested twice during a 6-month growing season in Boca Ciega Bay (Tampa Bay), Fla. In deeper or warmer waters where the growing season is protracted, three or more cuttings per year may prove practical.

[2 figures, 24 references] [Authors' abstract and extract of the introduction]

6.32 (0.5) THE ANTIBACTERIAL SUBSTANCES OF THE MARINE ALGA STICHOCHRYSIS IMMOBILIS (CHRYSOPHYTA)

Berland, Brigitte R., Daniel J. Bonin, Alain L. Cornu, Serge Y. Maestrini, and Jean-Paul Marino (Station Marine d'Endoume, Marseilles 7e, France)
Journal of Phycology 8, No. 4, 383-392 (Dec. 1972)

Algae are the primary producers of organic matter in the sea. Although bacteria are mainly algae-dependent as to their food, the algae-bacteria environment is not ruled by a simple trophic relationship; antibiosis may play an important role in marine ecology. The purpose of this study was to examine the substances extracted from the culture media of marine algae, and to test the action of these substances on bacteria isolated mainly from the marine environment. The present article is a report of results obtained with the chrysophyte S. immobilis. An initial gross screening was carried out with various algae species to choose an classify the most convenient species from the point of view of their antibacterial activity. A routine antibiogram technique was used [Y. A. Chabbert, L'antibiogramme. Sensibilité et résistance des bactéries aux antibiotiques. Ed. de la Tourelle, St. Mandé, France, 257 pp.].

S. immobilis was the most inhibiting of the algal species screened, and it was used in the present tests.

Two substances with antibacterial activity were concentrated from the culture medium of S. immobilis before senescence occurred. They were purified by a Sephadex G-25 filtration followed by 2-dimensional thin-layer chromatography on Merck F-254 silica gel plates. One of the substances is a peptide of molecular weight

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6.54 EFFECT OF DRYING AND DESOLVENTIZING ON THE FUNCTIONAL PROPERTIES OF FISH PROTEIN CONCENTRATE (FPC)

Dubrow, David L. (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Fishery Bulletin 71, No. 1, 99-104 (Jan. 1973)

Experiments were performed to determine the effects of drying and steam desolventizing on the functional properties of fish protein concentrate (FPC). The FPC's were produced by a room temperature extraction of either red hake or menhaden with azeotropic isopropyl alcohol. FPC's thus produced contained about 36% soluble protein and, when dried at ambient temperature and pressure, showed very little loss in protein solubility. Drying the extracted wet solids at 40° to 50°, 60° to 70°, 90° to 100°, or 140° to 150°C for 30 or 120 min produced decreased protein solubility, i.e., 30.7% (40° to 50°C) to 12.5% (100° to 120°C). Emulsion stability of an FPC-water-oil system was satisfactory with all samples except those dried at 140° to 150°C.

Desolventizing dry solids or alcohol wet solids by steam stripping produced a dramatic loss in soluble protein and emulsion stability. There was also a significant darkening in color of the FPC's desolventized as wet solids as compared to FPC's desolventized as dry solids.

Low temperature extraction coupled with low temperature drying produced FPC with greater functional properties than that produced by high temperature drying. To retain this functionality, methods other than steaming appear to be necessary. [1 figure, 3 tables, 6 references] Author's abstract and part of the summary

6.55 RECYCLING ANIMAL WASTES.
PART 1: THE PROBLEMS OF DISPOSAL, AND REGULATORY ASPECTS OF RECYCLED MANURES

Blair, Robert (Nutrition Section, Agricultural Research Council Poultry Research Center, West Mains Road, Edinburgh EH9 3JS, Scotland), and David W. Knight (Staveley Bank, West End, Halifax HX2 7PN, England)
Feedstuffs 45, No. 10, 32, 34 (Mar. 5, 1973)

The merits of manure disposal by using it in feed of farm animals (poultry and cattle) are discussed. The most successful method of utilizing manure is to reduce its moisture content to 15% or lower and then to include the milled material into compounded feedingstuffs. Manure dried to a moisture content below 10% will store for a year or more. The authors state that if the drying is carried out properly most of the microorganisms of the original manure will be destroyed. Use of poultry manure or litter as a feedingstuff for animals is not permitted in the United States, in part because these materials could contain drugs and antibiotics or their metabolites. The composition of dried poultry and cattle feces is shown in the table that follows.

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6.32 (0.5)

of 3400 and containing 11 different amino acids linked in a 30 amino-acid molecule. The authors were not able to assign a chemical group to the second substance but it had a molecular weight of 2600 and may be related to "humic acids." The growth of the most sensitive bacteria was completely inhibited by 20-fold, or higher, concentrations of substances from the filtrate of the algal culture. Fifty-four strains of test bacteria were used; they were of various origins, but were mostly isolated from algal cultures or obtained directly from the marine environment. [6 figures, 5 tables, 61 references] FTP

6.37 POSSIBLE USE OF CHLORELLA IN ANIMAL HUSBANDRY

Tomme, M. F., and V. A. Alekseev (U.S.S.R.)
Chemical Abstracts 78, No. 1, 3109p (Jan. 8, 1973)

6.55

Item	Poultry battery manure (mean)	Cattle feces (mean)	Item	Poultry battery manure (mean)	Cattle feces (mean)
Moisture %	11.4	10	Ether extract %	1.76	--
N 6.25 %	28.7	16.6	Nitrogen-free extract %(?)	35.61	--
Urea %	0.0	1.06	Available carbohydrate %	6.7	--
Uric acid %	6.3	--	Total sugars %	--	28.76
True protein %	10.5	--	Ash %	26.5	7.64
Total amino acids %	8.6	4.26	Ca %	7.8	1.56
Alanine %	0.61	0.45	P %	2.2	0.75
Arginine %	0.38	0.14	Na %	0.42	0.36
Aspartic acid %	0.71	0.52	K %	1.37	0.72
Glutamic acid %	1.12	0.66	Cu p.p.m.	61	15.63
Glycine %	1.33	0.37	Fe %	0.2	0.08
Histidine %	0.23	0.09	Zn p.p.m.	325	111.7
Isoleucine %	0.36	0.21	Mg %	0.63	0.27
Leucine %	0.55	0.44	Mn p.p.m.	291	88.7
Lysine %	0.39	0.33	Br p.p.m.	16	--
Methionine %	0.12	0.06	Cl %	0.93	--
Cystine %	0.15	--	Fiber %	13.84	--
Phenylalanine %	0.35	0.06			
Tyrosine %	0.27	0.04			
Proline %	--	0.24			
Serine %	0.38	0.15			
Threonine %	0.35	0.21			
Valine %	0.46	0.29			

FTP

6.132 AZEOTROPIC REMOVAL OF WATER-HYDROCARBON ALCOHOL MIXTURES FROM PRESS FISH CAKE

Meade, Thomas L. (69 Kenyon Ave., Wakefield, RI 02879) (pat.)
U.S. Patent 3,712,822
Official Gazette of the U.S. Patent Office 906, No. 4, 1400 (Jan. 22, 1973)

Wet fish press cake is preserved by the addition of an alcohol to the cake. The alcohol and water are subsequently removed from the press cake by azeotropic extraction with a hydrocarbon. By this process, the wet fish cake can be stored for long periods of time; the alcohol and water can be removed whenever convenient to produce a dry fishmeal product. FTP

6.1 MANUFACTURE OF MEAL AND OIL FROM OILY FISH

Lohne, Per, and Ådne Ø. Utvik (pat.) (Sildoljе- og Sildemelindustriens)
South African Patent 71 00,209 (Sept. 29, 1972)
Chemical Abstracts 78, No. 1, 3006c (Jan. 8, 1973)

6.55 FOOD ADDITIVE COMPOSITION OF SQUALENE, OLEYL ALCOHOL AND OLEIC AND LINOLEIC ACID

Stephenson, John L. (9004 Orange Hunt Lane, Annandale, VA 22003), and Joseph V. Gaven, Jr. (pat.)
U.S. Patent 3,723,130
Official Gazette of the U.S. Patent Office 908, No. 4, 1079 (Mar. 27, 1973)

A composition consisting of squalene, oleyl alcohol, oleic acid, and linoleic acid is added to feeds to improve their acceptance to animals. FTP

6.55 STIMULATING THE GROWTH OF POULTRY WITH COUMERMYCIN

Berger, Julius, and Wilbur Lewis Marusich (Hoffmann-La Roche, Inc.) (pat.)
U.S. Patent 3,662,063 (May 9, 1972)
Chemical Abstracts 77, No. 10, 66191j (Sept. 4, 1972)

6.55 RECYCLING ANIMAL WASTES.
PART 2: FEEDING RECYCLED WASTES TO POULTRY AND LIVESTOCK

Blair, Robert, and David W. Knight
Feedstuffs 45, No. 12, 31, 35-36, 55 (Mar. 19, 1973)

Part 1 dealing with the problems of disposal of animal wastes and the regulatory aspects was published in the March 5 issue of this journal [vol. 45, no. 10, pp. 32 and 34]. Part 2 is a discussion of tests in which dried manure was fed to poultry, pigs, sheep, and cattle.

Dried manure can be used successfully in poultry diets. Assuming that all the phosphorus was available, it was shown that dried poultry manure, because of its phosphorus, amino acid, and energy content, would by computer analysis be a selected ingredient until it reached a price of $26.00 per ton. The pig apparently utilizes manure to the same extent as poultry.

Dried poultry manure can be utilized more successfully as a feedstuff for ruminants than as a feedstuff for nonruminants. Dried poultry manure is more suitable for feeding purposes than dried cow manure or dried poultry litter because of its higher nitrogen and mineral content. In the United Kingdom, plants have been installed to dry poultry manure and, to a small extent, poultry litter. It is estimated that 3-7% of the poultry manure and 1-3% of the poultry litter available nationally in the United Kingdom are dried and used in animal feedingstuffs. Some data involving trials on the fattening of beef are shown in the table that follows.

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7.59 (9.19) DETERMINATION OF POLYCHLORINATED BIPHENYLS IN THE PRESENCE OF ORGANOCHLORINE PESTICIDES BY THIN-LAYER CHROMATOGRAPHY

Reinke, J., J. F. Uthe, and H. O'Brodovich (Dept. of the Environment, Fisheries Service, Freshwater Institute, Winnipeg, Ontario, Canada)
Environmental Letters 4, No. 3, 201-210 (1973) [Published by Marcel Dekker, Inc., 95 Madison Ave., New York, NY 10016]

Most of the thin-layer chromatographic methods used to separate polychlorinated biphenyls and organochlorine pesticides are only semiquantitative or confirmatory. In this paper, the authors describe a simple, quick, inexpensive and easily reproduced thin-layer chromatographic method for the separation and quantitation of the two groups of materials. The method utilizes an aluminum oxide plate developed in a triethylamine:hexane solvent, with the use of steam and ultraviolet treatment for visualization. The recoveries range from 90 to 100%.
[2 figures, 4 tables, 10 references] FTP

7.0 THE p-VALUE APPROACH TO QUANTITATIVE LIQUID-LIQUID EXTRACTION OF PESTICIDES AND HERBICIDES FROM WATER. 2. SELECTION OF WATER:SOLVENT RATIOS AND NUMBER OF EXTRACTIONS

Suffet, Irwin H. (Dept. of Chemistry, Environmental Studies Institute, Drexel University, Philadelphia, PA 19104)
Journal of Agricultural and Food Chemistry 21, No. 2, 288-294 (Mar.-Apr. 1973)

In the analysis of pesticide residues in water we are concerned with the reproducible minimum detectable level of a given analytical procedure. The goal is to recover 100% of a pesticide and its metabolites for quantitative analysis or identification. However, some of the compounds are lost during each step of the analytical procedure (extraction, concentration, cleanup). For more accurate results, these losses must be minimized.

The p-value concept was used earlier [M. Beroza, M. N. Inscoe, and M. C. Bowman, Residue Rev. 30, 1 (1969); I. H. Suffet, J. Agr. Food Chem., to be published in 1973] to determine the optimal pH and solvent to approach 100% recovery of pesticide. The p-value is "the fraction of the total solute that distributes itself in the nonpolar phase of an equivolume solvent pair"; therefore, it presents the partition coefficient on a fractional basis.

In the present study, the author developed equations from liquid-liquid extraction (LLE) theory for the number of extractions and water:solvent ratios for maximum recovery for typical p-values. By means of computer program analysis of the equations developed, it was shown that a pesticide which has a p-value of

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7.599 (7.42) GAS-LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY OF ORGANOMERCURY COMPOUNDS

Baughman, G. L., M. H. Carter, N. L. Wolf, and R. G. Zepp (Southeast Environmental Research Laboratory, College Station Road, Athens, GA 30601)
Journal of Chromatography 76, No. 2, 471-476 (Feb. 28, 1973)

Gas-liquid Chromatography (GLC) is widely used for the determination of methylmercury in fish, and now there is some interest in its use for the detection and analysis of organomercury compounds in environmental samples. S. Nishi and Y. Horimoto [Bunseki Kagaku (Jap. Anal.), 20, 16 (1969)] stated that ionic methylmercury compounds decompose during GLC. The present workers, therefore, examined the GLC behavior of organomercury compounds using GLC-MS (mass spectrometry).

Apparently the ionic methylmercury compounds do undergo decomposition during GLC; the decomposing proportion appears to increase as the sample size decreases. With large samples (10^{-5} g.), methylmercury salts (CH_3HgX; X = Cl, Br, or I) elute with characteristic retention times, but when samples are smaller (10^{-8} g.) single elution peaks having the same retention time are obtained regardless of X. The more ionic methylmercury compounds (methylmercuric hydroxide and methylmercuric acetate) are not eluted even at higher concentrations although decomposition products do emerge.

Phenylmercury salts decompose to give diphenyl mercury (major product). Organomercurials, dimethylmercury and diphenyl mercury, are eluted with no evidence of decomposition.

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7.0

>0.90 in an aqueous solvent system can be extracted from the aqueous phase with 95% recovery in ≤5 successive extractions of ≤50 ml. with a total volume of ≤500 ml. of solvent. The author successfully tested the equations with serial extraction of 2,4-D by separatory funnel and vortex stirring extraction procedures. He indicated that the contribution to the total error of initial LLE step was less than 20% for a four-step serial extraction.
[1 figure, 6 tables, 26 references] FTP

Ruzic, I. (Cent. Mar. Res., Inst. "Rudjer Boskovic," Zagreb, Yugoslavia)
Chemical Abstracts 78, No. 1, 2155p (Jan. 8, 1973)

7.0 TWO-COMPARTMENT MODEL OF RADIONUCLIDE ACCUMULATION INTO MARINE ORGANISMS. I. ACCUMULATION FROM A MEDIUM OF CONSTANT ACTIVITY

7.599 (7.42)

The authors indicate that reliable analyses for methylmercury salts may be achieved using GLC but only if specially treated columns are used to make the decomposition reactions reproducible. Inasmuch as phenylmercury salts decompose extensively, GLC is not a good method for their analyses.
[2 figures, 2 tables, 22 references] FTP

Woldich, H., and W. Pfannhauser (Fresch.-Inst. Ernaehrungswirtsch., Vienna, Austria)
Chemical Abstracts 77, No. 13, 86701d (Sept. 25, 1972)

7.42 (7.8) QUANTITATIVE ANALYSIS OF MERCURY IN BIOLOGICAL SAMPLES. I. SIMULTANEOUS EXTRACTION OF MERCURY AND COPPER AS DITHIZONATES AND THEIR SEPARATION

6.55

Item	Results of 7-month beef fattening diet trial			
	Ration A	Ration B	Ration C	Ration D
Dried poultry manure (%)	--	--	20	30
Price per ton ($)	74.40	76.80	69.60	67.80
Liveweight gain per day (lb.)	2.46	2.43	2.46	2.28
Feed conversion	5.85/1	5.94/1	5.83/1	6.08/1
Cost per lb. liveweight gain ($)	0.194	0.203	0.181	0.184

[3 figures, 2 tables, 54 references] FTP

Hyder, Kamaluddin (Texas A and M Univ., College Station, Tex.)
Chemical Abstracts 78, No. 3, 14595v (Jan. 22, 1973)

6.54 DEVELOPMENT OF A PROCESS FOR PREPARING A FISH PROTEIN CONCENTRATE WITH FUNCTIONAL PROPERTIES

7.590 [ON A SYSTEMATIC ANALYTICAL PROCEDURE BASING UPON THIN LAYER CHROMATOGRAPHY FOR THE IDENTIFICATION OF SLIGHTLY VOLATILE ORGANIC SUBSTANCES POSSESSING TOXICOLOGICAL OR TOXICOLOGICAL-ANALYTICAL RELEVANCE]
EIN SYSTEMATISCHER DÜNNSCHICHTCHROMATOGRAFISCHER UNTERSUCHUNGSGANG ZUR AUSMITTLUNG WENIG FLÜCHTIGER ORGANISCHER SUBSTANZEN VON TOXIKOLOGISCHER UND TOXIKOLOGISCH-ANALYTISCHER RELEVANZ

Ahrend, K.-F., and D. Tiess (Abteilung für Toxikologische Chemie am Institut für Gerichtliche Medizin des Bereiches Medizin der Universität Rostock)
Zentralblatt für Pharmazie, Pharmakotherapie und Laboratoriums-diagnostik 111, No. 9, 933-957 (1972) [In German; abstract in English]

A simple and universally applicable systematic analytical procedure based on thin-layer chromatography for the separation and identification of slightly volatile organic substances and extracts from biological materials is described. The chromatographic procedures involve the use of a general sorbent (Kieselgel G) and four different, but commonly used solvents. Control of chromatographic conditions is achieved by means of co-chromatography using system-specific standard mixtures of reference substances. Unknown substances are detected and assayed by the sequential application of certain spray reagents.
[31 references] FTP

7.599 AN EVALUATION OF THE ALKALI FLAME DETECTOR AND THE COULSON ELECTROLYTIC CONDUCTIVITY DETECTOR IN THE ANALYSIS OF N-NITROSAMINES IN FOODS

Palframan, J. F., J. MacNab, and N. T. Crosby (Laboratory of the Government Chemist, Cornwall House, Stamford St., London SE1 9NQ, England)
Journal of Chromatography 76, No. 2, 307-319 (Feb. 28, 1973)

This paper reports on the comparison of results obtained when using two different nitrogen detectors (the alkali flame ionization [thermionic] detector and the Coulson electrolytic conductivity detector) in conjunction with commercial gas chromatographs in the analysis of N-nitrosamines in foods. Only slight differences in sensitivities of the two detectors were observed; however, the Coulson electrolytic conductivity detector was more selective and was less disturbed by small changes in operating parameters. It is, thus, considered the more suitable for routine use in this field of analysis.
[10 figures, 2 tables, 44 references] FTP

9.12 (1.25) MIGRATIONS OF THE SHAD

Leggett, William C.
Scientific American 228, No. 3, 92-98 (Mar. 1973)

The American shad (Alosa sapidissima) is the largest member of the herring family, attaining lengths of 40-50 cm. and weights of 1,400-2,200 g. The shad is anadromous: The eggs hatch in fresh water; the young remain a few months and then move out to the sea. The shad live in the sea until sexually mature, about 3 to 6 years, then return to spawn in the stream where they were hatched. The adults that survive the annual spawning run return to the sea. Shad originally moved up and down the Atlantic coast of North America and spawned in the eastern rivers of the United States. In 1871, shad were successfully stocked in the Sacramento River of California. By 1880 they ranged widely off the Pacific coast.

In 1965 studies were undertaken to determine the effects of a thermal discharge from a power plant on the shad population. The plant is located on the Connecticut River at Haddam Neck, 15 miles above the mouth of the river. In addition to population data, information on ocean migratory routes and migration to spawning rivers was generated by the study.

More than 32,000 adult shad were tagged and released during the study and over 5,000 were recaptured in the Connecticut River. About 100 shad were captured at various places along the Atlantic coast, ranging from North Carolina to New Brunswick, Canada. Data indicate that from 1966 to 1972 the date when the first shad of the season was captured in the Connecticut River varied by only 5 days--April 7

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9.15 (0.5)(9.16) EDWARDSIELLA TARDA, A NEW PATHOGEN OF CHANNEL CATFISH (ICTALURUS PUNCTATUS)

Meyer, F. P., and G. L. Bullock (Bureau of Sport Fisheries and Wildlife, Stuttgart, AR 72160)
Applied Microbiology 25, No. 1, 155-156 (Jan. 1973)

Most of the bacterial diseases of cultured catfish are caused by aeromonads, pseudomonads, or myxobacteria. A systemic disease of cultured catfish occurring in 1969 was found to have been caused by the enteric organism E. tarda. The source of the organism infecting the catfish was not identified; it may have been fecal contamination from human or other animals. Outbreaks of the disease have occurred annually since 1969 in catfish farms in the southern states area. So far, only the channel catfish have been affected.

In mild cases the disease produces small cutaneous lesions; as the disease progresses abscesses develop within the muscle of the flanks or caudal peduncle; and in advanced cases, the abscesses increase in size and develop as large cavities filled with a foul odorous gas.

The disease may be controlled by incorporating Terramycin (oxytetracycline) in the diet of the catfish at a rate of 2.5 g. per 100 lb. of fish per day for 10 days.

Although the disease does not cause catastrophic losses of catfish, it does have a severe economic impact on the commercial fish farms where it may occur. If the disease is not detected before harvesting the fish, the rate of infection will quickly increase when the fish are held in confienment prior to processing. If

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9.15 (1.88) CERCARIA TENUANS, LARVAL TREMATODE PARASITE OF MYTILUS AND ITS SIGNIFICANCE IN MUSSEL CULTURE

Canzonier, Walter J. (Stazione Idrobiologica di Chioggia, Università di Padova, 300 15 Chioggia (VE) Italia)
Aquaculture 1, No. 3, 267-278 (Dec. 1972)

The parasite C. tenuans potentially could cause heavy losses to cultured stock if environmental factors and cultural procedures favor its development and dispersion. It is a minimal hazard at this time.

The trematode was found on about 4% of the mussel M. edulis imported into Italy from the Ria de Arosa on the northwest coast of Spain. The parasite was not found in a survey of native mussel populations in the Laguna Veneta (upper Adriatic coast of Italy). Infected mussels have an orange coloration that is characteristic of the disease, and the sporocysts (of the parasite) are visually motile, making recognition of the parasite possible with the unaided eye. Examination of infected mussel tissue indicated minimal pathology, with no obvious response to the presence of viable sporocysts. The authors suggest that at the low levels of the parasite reported it would not cause serious losses in natural and cultured mussel populations.
[2 figures, 1 table, 11 references] SW

9.12 (1.25)

to April 12. The movement of shad into the river continued until June. By capturing tagged shad, their marine movements were plotted and found to be related to water temperatures in the rivers and the sea. When the temperature was below 4° C. few shad entered the Connecticut River; above that temperature the number of shad increased until the water was about 13° C. Further up the river at Holyoke, Mass., the peak movement of fish over a hydroelectric dam fish lift took place at temperatures between 16.5° and 21.5° C. In the southern river, the St. Johns, the shad waited until the temperature declined to below 20° C. before entering from the sea. On the Pacific coast, the peak movement of shad over the Bonneville Dam ladders on the Columbia River occurs between 16.5° and 19° C. The hatching and survival of shad eggs and young are at a maximum when the water temperature is between 15.5° and 26.5° C. Shad entering the Connecticut River early in the season when temperatures were low had a higher return rate than shad entering at higher temperatures. It was further found that higher temperature rivers south of the Chesapeake (Bay) lacked repeat spawners, but this disadvantage was compensated by earlier maturity and greater fecundity.

Shad entering the Connecticut River to spawn avoid the plume of warm water from the generating plant by moving in the ship channel near the shore opposite the plant. [7 figures] SW

9.16 SYMPOSIUM ON MOLLUSCAN AQUACULTURE

Shaw, William N. (convener) (Marine Extension, National Marine Fisheries Service, NOAA, Easton, Md.)
Bulletin of the American Malacological Union, Inc., Annual Report, 27 pp. (Feb. 1972). Price not given. (3957 Marlow Court, Seaford, NY 11783)

The papers presented at the symposium are listed below.
"The Role of Genetics in Molluscan Mariculture," by R. W. Menzel, p. 13;
"Recent Advances in Clam Aquaculture," by Hugh J. Porter, p. 16;
"Development of Closed System Oyster Culture," by Don Maurer, p. 18;
"Mariculture Experiments With the Bay Scallop, Argopecten irradians, in Waters of the Seaside of Virginia," by Michael Castagna and William P. Duggan. p. 21;
"Aquaculture of Mollusks in the Gulf Coast Region," by T. J. Costello, p. 22;
"Aquaculture of Mollusks Along the West Coast of the United States," by William N. Shaw, 23; and
"Molluscan Aquaculture in British Columbia," by Neil Bourne, p. 25.
Each article has a bibliography; over half the articles are illustrated. SW

7.773 THE REPRESENTATION OF LOWER MOLECULAR WEIGHT FATTY ACIDS BY THE BLIGH AND DYER EXTRACTION METHOD

Hurst, R. E. (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 12, 1786-1787 (Dec. 1972)

The presence of free fatty acids is used as an index of deterioration of fish tissue. The accumulation of long chain fatty acids is caused by hydrolysis of triglycerides; an increase in short chain fatty acids is attributed to autoxidation. The method of E. G. Bligh and W. J. Dyer [Can. J. Biochem. Physiol. 37, 911-917 (1959)] is capable of extracting over 90% of fatty acids with chain lengths of 14 or more carbons. In experiments performed to determine the relation of short chain fatty acids to the Bligh and Dyer method it was shown that low molecular weight fatty acids are not effectively recovered in the chloroform phase of the solvent system.
[1 figure, 10 references] SW

9.15 (0.5)(9.16)

infected fish reach the processing line, it will be necessary to halt processing to permit removal of the infected fish and sterilization and deodorization of the equipment. Financial losses may be great even when only a small number of infected fish are involved.
[3 references] FTP

9.15 PROGRESS IN FISH PATHOLOGY IN THIS CENTURY

Snieszko, S. F. (Eastern Fish Disease Laboratory, Leetown, Kearneysville, W. Va.)
Symp. Zool. Soc. Lond. 30, 1-15 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 1, 3Q802G, p. 177 (Jan. 1973)

The premise that epidemics are caused by lack of balance between the host, the pathogen or other disease agents, and the environment is the basis for modern epidemiology. Aquatic coldblooded animals are affected more by the environment than are warmblooded land animals. Consequently, epidemics in fish are strongly affected by environmental factors. Diseases that show clearly the effects of environment were selected to highlight this review of the history of fish pathology.
SW

7.44 ROUTINE METHODS FOR THE EXAMINATION OF MEAT AND MEAT PRODUCTS. 10. THE DETERMINATION OF NITROGEN BY KJELDAHL. THE NITROGEN SUBSTANCE, INTERPRETATION AND POSSIBLE ERROR

Wyler, O. D.
Fleischwirtschaft 52, No. 9, 1088-1090 (1972) (In German)
Food R.A. Abstracts 26, No. 1, Abstract No. 12, 2 (Jan. 1973)

The method is discussed in relation to its application to meat and meat products and details of the method are given. C.S.B. Reprinted

9.16 REPORTS ON FISH CULTURE RESEARCH SUPPORTED BY ROCKEFELLER FOUNDATION

[Various authors and reports as listed below]
Joint Commission on Rural Reconstruction, Fisheries Series No. 12, Taipei, Taiwan, Republic of China (June 1972), 87 pp.

Card A

This series contain eight progress reports on fish culture research supported by the Rockefeller Foundation. These are as follows:
"Preliminary Report on the Mass Propagation of Grey Mullet, Mugil cephalus Linnaeus," by I-Chiu Liao, Ching-Shan Cheng, Lei-chiang Tseng, Mee-yoon Lim, Lung-sheng Hsieh, and Husei-pin Chen, pp. 1-14. [In English]
This paper summarizes the work carried out on the mass production of grey mullet fingerlings over a 2-year period starting in 1970. [4 figures, 3 tables, 5 references]
" A Survey of the Chemical Properties of Bottom Soils of Freshwater Fish Ponds in Taiwan," by W. Chiang, C. Y. Jaw, A. L. Hsieh, and H. S. Shyu, pp. 15-34. [In Chinese; English summary]
This paper describes the physical characteristics and gives the chemical composition of the bottom soils of selected fresh-water fishponds in Taiwan. The texture of the soil fell into eight classes: clay, silty clay, silty loam, silty clay loam, clay loam, sandy loam, sandy clay loam, and loam. The pH ranged from 5 to 7.5; organic content from 0.65% to 10.0%; total nitrogen content from 0.09% to 0.70%; and inorganic phosphorus ranged from 141.9 to 2,531 p.p.m. The concentration of calcium "phosphorus," iron "phosphorus," aluminum "phosphorus," and

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9.16 REPORTS OF FISH CULTURE RESEARCH SUPPORTED BY ROCKEFELLER FOUNDATION

[Various authors and reports as listed below]
Joint Commission on Rural Reconstruction, Fisheries Series No. 12, Taipei, Taiwan, Republic of China (June 1972), 87 pp.

Card B

Descriptions, photographs, and drawings are given for various species of protozoa, trematoda, and parasitic copepods infecting pond fishes of Taiwan. The organisms were collected from Sept. 1971 to Mar. 1972 and represent only a limited collection. [13 figures, 21 references]
"Experiments on Artificial Propagation of the White-Spotted Freshwater Catfish, Clarias fuscus (Lacépède)," by Ting-lang Huang and Huei-pin Chen (Tainan Fish Culture Station, Taiwan Fisheries Research Institute), and Chin-pao Hung (Tungkang Marine Laboratory, Taiwan Fisheries Research Institute), pp. 66-70. [In Chinese; abstract in English]
Two fresh-water catfish spawners that received fresh pituitary gland of common carp plus Synahorin achieved 100% ovulation, 90% fertilization, and 95% hatching rate. Those that received vacuum dried pituitary extract from common carp plus Synahorin achieved 60% ovulation, 60% fertilization, and 85% hatching rate. [8 figures, 1 table]
"Induced Spawning of the Catfish, Parasilurus asotus (Linnaeus)," by Gin-fu Chen, pp. 71-83. [In Chinese; English summary]

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9.16 STUDIES ON THE NUTRITION OF MARINE FLATFISH. THE EFFECT OF ORAL ADMINISTRATION OF DIETHYLSTILBOESTROL AND CYPROHEPTADINE ON THE GROWTH OF PLEURONECTES PLATESSA

Cowey, C. B. (Natural Environment Research Council, Institute of Marine Biochemistry, Aberdeen, Scotland), J. A. Pope, J. W. Adron, and A. Blair
Marine Biology 19, No. 1, 1-6 (Mar. 1973)

The purpose of this study was to determine the effect of oral administration of different levels of diethylstilboestrol (DES) and cyproheptadine (CH) on body weight gain of plaice. DES was added to the test diet at levels of 600, 1,200, and 2,400 µg./kg. of the moist diet (53% water; 45% protein); the CH was added at levels of 50,000, 100,000, and 200,000 µg./kg. of the moist diet. The plaice were held in tanks at water temperature of 15° C. and were fed three times daily during a 12-hr. photoperiod. The test lasted 10 weeks.
Low-level orally administered DES (at 600 µg./kg. of the moist diet) gave rise to increased weight gain, food consumption, and food conversions of the fish. Higher dietary levels of DES were without effect on these parameters. The CH did not stimulate appetite, weight gain, or food conversion of the plaice at any of the levels tested.
[2 figures, 7 tables, 21 references]

FTP

9.16 PACIFIC SALMON AQUACULTURE PROGRAM. INCUBATION AND CULTIVATION PHASES

Lindbergh, Jon M.
Sea Grant Final Report, 52+2+1+3 pp. (n.d.) Ocean Systems, Inc., and Domsea Farms, Inc., 11440 Isaac Newton Square North, Reston, VA 22091.

The purpose of the program was to examine the feasibility of raising marketable-sized salmon on a commercial scale in Puget Sound, Washington. The report describes the six phases of the program: (1) Incubation of the salmon eggs, (2) Cultivation of fingerling salmon in fresh-water ponds, (3) Cultivation of salmon to a marketable size in floating pens in sea water, (4) Harvesting and test marketing, (5) Stimulation of public awareness of the acquaculture potential in the Puget Sound area, and (6) Environmental monitoring of waste materials associated with the project.
About 211,000 coho salmon were raised from eggs to an average marketable size (12 in., about 340 g.) in 14 months using floating net pens. Growth rates and conversion rates of the coho salmon were good; the fish were healthy. Market acceptance was good. The report states that salmon aquaculture appears to be ready for commercial development although there are substantial risks. Significant problems remaining to be solved are: (1) Adequate inventory control of fish was not achieved; (2) Chinook salmon did not do well and appears not to be suitable for aquaculture at the present state of the art; (3) Significant numbers of one group of coho transferred to sea water in August did not begin to grow until spring, and

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it appears that the coho salmon must be transferred early in summer; (4) More adequate sea-water facilities must be designed to improve maintenance and logistics characteristics; (5) Further research is needed on adequate foods for the fish; and (6) Genetic selection of suitable strains of coho salmon may be desirable over the use of fish spawned from wild parents. FTP

9.16 VIBRIO PARAHAEMOLYTICUS: A PROBLEM IN MARICULTURE? (1.85)

Vanderzant, C., and R. Nickelson
Journal of Milk and Food Technology 46, No. 3, 135-139 (Mar. 1973)

Other reports indicated many outbreaks of diseases associated with Vibrio sp. In aquaculture operations, reports from Japanese workers indicated that Vibrio sp. represent a major problem. Information implicating V. parahaemolyticus in fish disease is sparse. In pond-cultivated brown shrimp, coryneform and Vibrio sp. of bacteria predominate. Mortalities among brown shrimp caused by V. parahaemolyticus have been observed in the laboratory. However, there is no indication that the microorganism is a major problem in pond-cultivated shrimp in Texas.

[1 figure, 5 tables, 28 references] SW

9.1 HATCHING PROCESS IN FISH. II. PURIFICATION AND CHARACTERIZATION OF HATCHING SECRETION IN RAINBOW TROUT (SALMO GAIRDNERI)

Hagenmaier, H. E. (Zool. Inst., Tech. Hochsch. Aachen, Aachen, Germany)
Chemical Abstracts 77, No. 25, 162132p (Dec. 18, 1972)

9.17 A BIBLIOGRAPHY OF ARTIFICIAL REEFS AND OTHER MAN-MADE FISH ATTRACTANTS WITH SELECTED PERTINENT BIOLOGICAL AND ECOLOGICAL REFERENCES

Rickards, William L. (Sea Grant Program, School of Public Health, University of North Carolina, Chapel Hill, NC 27514)
Sea Grant Publication UNC-SG-73-04, 22 pp. (Mar. 1973). Sea Grant Program, School of Public Health, University of North Carolina, Chapel Hill, NC 27514.

This bibliography contains literature citations on man-made fish attractants. Such attractants may be floating or off-bottom structures and artificial reefs. The bibliography includes a section dealing with selected biological and ecological literature relative to the construction, maintenance, and evaluation of man-made fish attractants.
[285 citations] FTP

9.14 METABOLIC CHANGES IN FISH CAUSED BY DIET VARIATION. I. EFFECTS OF DIET COMPOSITION ON THE METABOLIC CHANGES IN CARP

Hayama, Kazuhiko, and Shizunori Ikeda (Fac. Agric., Kyoto Univ., Kyoto, Japan)
Chemical Abstracts 77, No. 17, 112815r (Oct. 23, 1972)

9.16

Treatment of the catfish with a mixture of pituitary hormone and tannic acid was found to be the most satisfactory among several treatments used to induce spawning of the fish. [5 figures, 4 tables, 9 references]

"Preparation of Sex Stimulating Hormone From Pituitary Glands of Common Carp," by Hon-der Lin, pp. 84-87. [In Chinese; abstract in English]

In the artificial propagation of fish, hormone (pituitary) treatment is used to stimulate maturation and ovulation. This paper describes the extraction of the hormone from the pituitary gland of the common carp.
[3 tables, 3 references] FTP

9.16

soluble phosphorus was 70.3%, 22.8%, 6.6%, and 0.23%, respectively, of the total inorganic phosphorus. The sodium level ranged from 0.01% to 0.04%; potassium, from 0.01% to 0.05%; calcium, from 0.03% to 0.6%; and magnesium, from 0.01 to 0.11%. [11 figures, 1 table, 17 references]

"Ecological Study of Milkfish Wintering Pond," by Hon-cheng Chen and Chi-yang Liu, pp. 35-49. [In Chinese; abstract in English]

The late season fingerlings of milkfish Chanos chanos must be stocked in wintering ponds in order that they may survive the winter; the overwinter mortality runs about 14%. This paper reports on the physical, chemical, and biological aspects of these wintering ponds. The two main factors causing fish kills are low-water temperature and oxygen deficiency. [19 figures, 1 table, 10 references]

"Studies on the Control of Brown Water in Milkfish (Chanos chanos) Ponds," by Shih-lin Shen and Young-meng Chiang, pp. 50-53. [In Chinese; abstract in English]

A bloom of Olisthodicus carterae caused the formation of brown water in the pond used to rear milkfish. The O. carterae grew in a wide range of salinity but was suppressed at salinities from 3.55 ‰ to 8.87 ‰. $CuSO_4$ and bleaching powder [hypochlorite ?] arrested growth of the organism but CaO did not. [5 tables, 6 references]

"Some Parasites Found in Pond Fishes of Taiwan," by Yen-pin Li and Shiu-nan Chen, pp. 54-65.

[Continued on Card B]

9.19 DDE: INTERFERENCE WITH EXTRA-RENAL SALT EXCRETION IN THE MALLARD

Friend, M., M. A. Haegele, and R. Wilson (U.S. Bureau of Sport Fisheries and Wildlife, Denver Wildlife Research Center, Denver, CO 80225)
Bulletin of Environmental Contamination and Toxicology 9, No. 1, 49-53 (Jan. 1973)

Of the shore birds showing population declines caused by pollution, all have in common a functional salt gland. The salt gland is the main route of sodium chloride excretion of birds living in a marine environment. As excess salt is ingested in their natural foods in habitats of high salinity, suppression of the salt gland function could be detrimental.

In other reports, DDT and its metabolites (such as DDE) were found to disrupt osmoregulatory function in marine fish.

A preliminary study was conducted to determine the effects of DDE (dichlorodiphenyldichloroethylene) on salt gland function in the mallard (Anas platyrhynchos). Groups of 5-month-old mallards were maintained on either fresh water or 1% salt water for 5 days before feeding with DDE supplements of 0, 10, 100, or 1,000 p.p.m. to commercial game bird pellet rations. The ducks from each group were injected with concentrated salt solutions: 12 ml. of a 10% solution intraperitoneally and 3 ml. of a 5% solution intravenously. Discharges from the salt gland were collected at 15-min. intervals for 2½ hr.

The results of the tests indicate that the composition of the salt excretions were unchanged. In addition, ducks fed 1% salt solution with their feed before receiving injections of concentrated salt solutions excreted about twice as much

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9.19 PCB RESIDUES IN ATLANTIC ZOOPLANKTON

Risebrough, R. W., and Valerie Vreeland
Bulletin of Environmental Contamination and Toxicology 8, No. 6, 345-355 (Dec. 1972)

Transport of pesticides by the wind is a major route of entry of these compounds to the marine environment. Although a large proportion of polychlorinated biphenyls (PCBs) are not released to the environment, they were detectable in all samples of rainwater in Great Britain, and they were found in fish taken from remote Arctic lakes.

To determine the presence of PCBs at the beginning of the food chain, samples of zooplankton from the Northwest Atlantic shelf and the open North and South Atlantic areas were taken for testing. The samples were ground and extracted with a 2:1 mixture of hexane and acetone. After clean-up procedures the extracts were subjected to gas chromatography analysis which confirmed the presence of PCBs by matching peaks of Aroclor 1254.

Results of the survey indicated that PCBs in zooplankton from the continental shelf and slope ranged from 0.071 to 3.0 p.p.m. dry weight. In the open North Atlantic the PCB content of zooplankton ranged from 0.30 to 0.45 p.p.m. wet weight. In the open South Atlantic the range was from 0.018 to 0.64 p.p.m. wet weight. The authors caution that the amount of PCBs found in the zooplankton might not reflect the overall PCB composition in the marine environment.

[1 table, 23 references]

SW

9.19 (6.54) MERCURY REMOVAL FROM FISH PROTEIN CONCENTRATE

Regier, L. W. (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 12, 1777-1779 (Dec. 1972)

The processing required in the production of fish protein concentrate (FPC) may present the possibilities of removing or reducing contaminants, such as mercury and mercury-containing compounds. Experiments were performed to determine whether mercury could be removed from FPC made by the isopropanol (IPA) extraction method [H. E. Power, J. Fish. Res. Bd Canada 19, 1039-1045 (1962)].

Commercially caught swordfish, that had been diverted from the market because of high mercury levels, was selected for processing into FPC by the IPA method. Before processing, the fish was thawed, chopped, and deboned. After the processing was complete, samples of the unprocessed deboned meat, the filter cakes after each of three extractions, and the finished product were analyzed for mercury. The unprocessed sample contained 1.01 p.p.m. mercury (wet basis); the finished FPC contained 5.69 p.p.m. mercury (wet basis). The results indicated that the unmodified process did not remove the mercury.

The finished FPC was reextracted with either isopropanol or ethanol acidified with various concentrations of hydrochloric acid. Isopropanol (99%) with a concentration of 0.55% HCl did not remove any mercury; isopropanol containing 4.43% HCl removed 86% of the mercury. A concentration of 70% isopropanol containing

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9.19 THE EFFECT OF PARATHION ON CRUSTACEAN SKELETAL MUSCLE-- II. DISRUPTION OF EXCITATION-CONTRACTION COUPLING

Bradbury, S. J. (Dept. of Biological Sciences, University of Lancaster, Bailrigg, Lancaster, England)
Comparative Biochemistry and Physiology 44, No. 4A, 1033-1046 (April 1, 1973)

Earlier work has shown that sublethal doses of parathion have important side effects which are not related to its anticholinesterase action. S. J. Bradbury [Comp. Biochem. Physiol. 44A, 1021-1032 (1973)] mentioned the induction by parathion of tonic contractures in the skeletal muscle of crab. The drug must in some way activate the excitation-contraction coupling mechanism of the muscle fibers. The present study was carried out to locate the action of the insecticide. In all the experiments, the contracture-induction effect was examined in terms of disruption of the electromechanical coupling process at the stages of membrane depolarization, the reticular calcium control system, actomyosin cross bridge formation, and structural changes in the fibers.

Apparently parathion action in the excitation-contraction coupling cycle is subcellular. It significantly depresses reticular calcium uptake. Also, the drug greatly modifies actomyosin superprecipitation and disrupts the reticular fine structure, suggesting a massive calcium loss from the reticulum into the myoplasm.

[10 figures, 1 table, 30 references]

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9.19 (6.54)

2.61% HCl removed 57% of the mercury. Ethanol (95%) containing 0.28, 0.5, and 1.09% HCl did not remove any mercury from the FPC; however, 95% ethanol containing 2.61% HCl removed 74% of the mercury in FPC.

The author suggests that nearly all mercury can be removed from swordfish FPC under conditions which should not destroy the nutrient value of the protein. However, a solvent system should be used that does not introduce questions regarding toxicity. [3 tables, 4 references] SW

9.19 TRACE ELEMENT CONTENT OF SOME FISH SPECIES OF THE ADRIATIC COASTS, IN RELATION TO THE PRESENCE OF INDUSTRIAL WASTES

Ciusa, Walter, and Mario Giaccio (Ist. Merceol. Univ. Bologna, Pescara, Italy)
Chemical Abstracts 78, No. 1, 2897g (Jan. 8, 1973)

9.19

sodium chloride as the ducks maintained on fresh water before the injection of the concentrated salt solutions. Furthermore, the salt glands of ducks previously stimulated with low-level salt were twice as large as those in ducks maintained on fresh water.

The authors concluded that DDE has no effect on excretion of salt from salt glands of mallards previously stimulated by low-level salt exposure. On the other hand, DDE can suppress salt gland excretion of salt in mallards not previously exposed to salt. The implications of the effects of DDE exposure on shore birds, juveniles or adults, not previously exposed to salt are that they would be unable to eliminate toxic levels of salt taken in while feeding.
[3 figures, 2 tables, 8 references] SW

9.19 EFFECTS OF AGRICULTURAL CHEMICALS ON FISH. I. CHANGES OF CHEMICAL COMPONENTS IN THE SERUM AND LIVER OF CARP EXPOSED TO ORGANOPHOSPHATE COMPOUNDS

Sakaguchi, Hitomi (Fish. Exp. Stn. Hyogo, Akashi, Japan)
Chemical Abstracts 77, No. 25, 160802f (Dec. 18, 1972)

9.19 POLYCHLORINATED BIPHENYL- AND TRIPHENYL-INDUCED GASTRIC MUCOSAL HYPERPLASIA IN PRIMATES

Allen, J. R., and D. H. Norback (Dept. of Pathology, Medical School, and Regional Primate Research Center, University of Wisconsin, Madison, WI 53706)
Science 179, No. 4072, 498-499 (Feb. 2, 1973)

Male rhesus monkeys were fed diets containing polychlorinated biphenyl or polychlorinated triphenyl for 3 months. Six monkeys were fed a diet containing 300 p.p.m. of PCB (Arochlor 1248); six were fed a diet containing 5,000 p.p.m. of PCT (Aroclor 5460); and three served as controls. Those animals fed a diet containing the test chemicals continued to eat throughout the experimental period, but they lost 15% of their body weight and showed various other symptoms. Ingestion of the polychlorinated biphenyl or polychlorinated triphenyl produced hyperplasia [increase in the number of tissue elements, excluding tumor formation] and dysplasia [abnormal tissue development] of the gastric mucosa. It is interesting to note that the concentration of the polychlorinated biphenyl in the diet was less than one order of magnitude greater than that occurring in random food samples sold in the market and less than levels that have occurred in food products as a result of industrial accidents. The authors believe that the dysplastic cellular abnormalities of the hypertrophic gastric mucosa are likely due to chronic irritation but at present are short of neoplastic transformation. Furthermore, they indicate that development of hypertrophy, hyperplasia, and dysplasia of the gastric mucosa of subhuman primates requires clarification of the carcinogenic potentials of these compounds.
[2 figures, 12 references] FTP

9.19 ECOLOGICAL SIGNIFICANCE OF THE DISCHARGE OF TREATED WASTEWATERS INTO COASTAL WATERS

Hlavka, George E. (Southern California Coastal Water Research Project, 1100 Glendon Ave., Los Angeles, CA 90024)
Journal of Milk and Food Technology 36, No. 1, 23-27 (Jan. 1973)

Research work is being carried out under the Southern California Coastal Water Research Project to obtain an understanding of the ecology of the coastal waters of Southern California. The study is expected to provide an insight into the past, present, and predicted effects of man on the ecology of the area, particularly those effects caused by wastewater discharges. The results will be needed in any effort to limit harmful effects on the environment and to promote its enhancement. The work so far dealt with 17 task areas of physical and chemical oceanography, marine biology, and environmental engineering. This paper is a discussion of some of the technical problems associated with the study (quantifying the natural fluctuations of physical, chemical, and biological parameters, establishing environmental criteria, and correlating observed effects with pollutant distributions).
[1 figure, 1 table, 1 reference] FTP

9.19 ENVIRONMENTAL ASPECTS OF NUCLEAR POWER STATIONS

Bethlendy, George (974 Vera Cruze Drive, Mississauga, Ontario, Canada)
Environmental Letters 4, No. 3, 151-185 (1973) [Published by Marcel Dekker, Inc., 95 Madison Ave., New York, NY 10016]

This is the first part of a monograph by the author. The monograph consists of an introduction and nine chapters, and it will be published in serial form in this and following consecutive editions of this journal.

Our exposure to the radioactivity from nuclear power sources is minute compared to that from nature and from diagnostic and therapeutic X-rays. The world's need for energy will quadruple in the next 30 years and it appears that a growing share of the total will be provided by nuclear energy. The growth in nuclear power production will increase the amount of radioactive wastes that must be managed to avoid environmental pollution. This could be done, because the technology of nuclear waste management is well developed.

Nuclear energy will eventually diminish pollution as it replaces other sources of electrical power such as coal and oil. Nevertheless, particular attention is being given to problems such as the thermal effects of nuclear power plants, the improvement of the technology and economics of containment techniques for reactors and radioactive waste, decommissioning of old nuclear power plants, and the behavior of radioactive materials in water and aquatic organisms.

[8 figures, 5 tables, 4 references] FTP

9.19 (0.6) REDUCTION OF MERCURY WITH CYSTEINE IN COMMINUTED HALIBUT AND HAKE FISH PROTEIN CONCENTRATE

Spinelli, John, Maynard A. Steinberg, Ruth Miller, Alice Hall, and Lawrence Lehman (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Pacific Fishery Products Technology Center, Seattle, WA 98112)
Journal of Agricultural and Food Chemistry 21, No. 2, 264-268 (Mar.-Apr. 1973)

In some areas, certain fish are routinely analyzed for mercury content to see that they do not exceed the established level of 0.5 p.p.m. Fish containing more than this level of mercury are not marketed and may represent a serious economic loss to the fishing industry. These losses might possibly be reduced, if some means could be devised to remove some of the mercury from the fish flesh. With this economic loss in mind, the researchers carried out tests to determine the effectiveness of the use of cysteine in reducing the mercury content of comminuted fish flesh and of fish protein concentrate. Sulfhydryl compounds (containing the mercapto group -SH) react with mercury and certain of them (for example, 2,3-dimercapto-1-propanol) have been used as detoxicants in cases of mercury poisoning. The amino-acid cysteine is a naturally occurring sulfhydryl-containing compound.

Communited fish (hake) flesh was extracted with 0.1 M NaCl containing cysteine $HCl \cdot H_2O$ at levels of 0.1%, 0.2%, and 0.5%. The orginal level of mercury in the fish flesh ranged from 1.06 to 1.20 p.p.m., wet weight of fish. The amount of mercury extracted from the comminuted fish varied with the concentration in the tissue and pH; the relationship was not linear. When the comminuted fish was extracted with 0.1 M NaCl containing 0.1% cysteine, about 22% of the mercury was

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9.19 THE EFFECT OF INCREASED TEMPERATURE UPON THE ACUTE TOXICITY OF SOME HEAVY METAL IONS

Rehwoldt, Robert, Lawrence W. Menapace, Brian Nerrie, and Denise Alessandrello (Environmental Science Program, Marist College, Poughkeepsie, N.Y.)
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 91-94 (Aug. 1972)

Thermal discharges into a body of water raise the temperature of the water, increase the metabolism of aquatic life, and decrease the solubility of oxygen. In addition, substances that control water quality are affected such as increases in solubility and diffusion rates. The toxicity of water-soluble toxic substances is related not only to temperature but also to water qualities such as hardness and mechanism of producing toxicosis. For example, if the mechanism for producing toxicosis involved an intercellular, biochemical reaction, an increase in water temperature predictably would increase toxicity. In contrast, if the toxic mechanism involved the deposition of a gelatinous metal hydroxide on the gill membranes of a fish, hardness of the water would be the factor affecting toxicity rather than temperature.

The toxicity of six metal ions was investigated at water temperatures of 28° C. and 15° C. The temperature of 28° C. was selected because it is the same as the ambient temperature of the thermal plume of a power station on the Hudson River at the town of Newburgh, N.Y. The mean toxicity limit for 50% survival of six representative Hudson River fish species relative to the ions and temperatures was established. The fish species were banded killifish, striped bass, pumpkinseed, white perch, American eel, and carp. The toxicity of the following ions was tested: Cu^{++}, Zn^{++}, Ni^{++}, Cd^{++}, Hg^{++}, and Cr^{++}.

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9.19 THE INFLUENCE OF TEMPERATURE AND SALINITY ON THE TOXICITY OF CADMIUM TO THE FIDDLER CRAB, UCA PUGILATOR

O'Hara, James (Belle W. Baruch Coastal Research Institute, University of South Carolina, Columbia, SC 29208)
Fishery Bulletin 71, No. 1, 149-153 (Jan. 1973)

The waste discharge of electroplating plants, lead and zinc mines, and chemical plants frequently contains toxic cadmium salts which contribute to the widespread environment pollution, and the importance of this pollutant has been stressed by its relationship with the crippling "itai-itai" disease of Japan. The effects of cadmium on aquatic organisms have been investigated for numerous freshwater organisms, and while the cadmium is normally flushed down to the estuarine and marine environments, little information is available on the effects of cadmium on estuarine forms.

The present paper reports on the effects of chronic exposure of fiddler crab to cadmium. The synergistic role of salinity and thermal stress on the acute toxicity of cadmium to the crabs was examined.

The concentrations of cadmium lethal to the fiddler crab, were determined for various environmental regimes of temperature and salinity. Mortality was greatest in high temperatures and low salinities when tested for 240 hr. Concentrations of cadmium were greatest in green gland followed by gill, hepatopancreas, and muscle.

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9.19

The results of the tests indicated that toxicity of the ions was the same at either temperature except for Hg^{++}; the mean toxicity limit for 50% survival at 15° C. ranged from 0.37-0.74 p.p.m., while at 28° C. it ranged from 0.08-0.42 p.p.m. The authors concluded that the toxicity of mercury increases as the temperature increases.
[4 tables, 9 references] SW

Jernelov, Arne, Rutger Rosenberg, and Soren Jensen (Swed. Water Air Pollut. Res. Lab., Goteborg, Sweden)
Chemical Abstracts 78, No. 1, 849u (Jan. 8, 1973)

9.19 BIOLOGICAL EFFECTS AND PHYSICAL PROPERTIES IN THE MARINE ENVIRONMENT OF ALIPHATIC CHLORINATED BYPRODUCTS FROM VINYL CHLORIDE PRODUCTION

9.19

Earlier workers suggested that there is a threshold concentration of cadmium in the gill tissue of fishes and that death occurs when this concentration is exceeded. This threshold may be around 110 ppm for fiddler crabs.
The relationship between cadmium toxicity and temperature and salinity variation illustrates that physiological stresses, even within the usual ecological range experienced by the animals, lowers the tolerance of organisms to environmental pollutants.
[2 figures, 1 table, 13 references] Extracted with slight modification

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Hansen, Larry G., Inder P. Kapoor, and Robert L. Metcalf (Dep. Entomol., Univ. Illinois, Urbana, Ill.)
Chemical Abstracts 78, No. 1, 869a (Jan. 8, 1973)

9.19 BIOCHEMISTRY OF SELECTIVE TOXICITY AND BIODEGRADABILITY.
(0.39) COMPARATIVE O-DEALKYLATION BY AQUATIC ORGANISMS

9.19 (0.6)

removed by the third extraction. When the extractant contained 0.2% cysteine, about 40% of the mercury was removed by the third extraction. When the extractant contained 0.5% cysteine, about 40% of the mercury was removed in the first extraction, and only an additional total of 10% was removed in the succeeding two extractions. When the comminuted fish was extracted with 0.1 M HCl there appeared to be an increase in mercury content. This seemed to indicate that the mercury in the fish flesh is associated with the myofibrillar or other insoluble proteins and not with the soluble sarcoplasmic proteins that were removed by the 0.1 M NaCl.
When cysteine was added to the isopropyl alcohol used in the first extraction of fish to prepare fish protein concentrate, the mercury level of the FPC was reduced by 50%.
[5 figures, 6 tables, 17 references] FTP

Koerting, W. (Zool-Parasitol. Inst., Univ. Muenchen, Munich, Germany)
Chemical Abstracts 77, No. 25, 160692v (Dec. 18, 1972)

9.19 SEWAGE DAMAGE TO FISH

9.19 ECONOMICS AND THE ENVIRONMENT. CAN THE SPOILS OF SUCCESS
(9.2) BE CONTROLLED?

Morris, David F. (Wayne Law Review, Wayne State University Law School, 468 W. Ferry St., Detroit, MI 48202)
Wayne Law Review 19, No. 1, 181-219 (Nov. 1972)

The popular method for pollution control today is to enact laws and regulations directed at specific types of environmental abuse. The author contends that such an approach will not produce a long run solution to the problem of pollution. The proper solution, he states, is to permanently ingrain the costs of pollution within our present market structure by "internalizing" the environmental "externalities." This comment considers (1) the macroeconomic aspects of environmental pollution resulting from the interplay between growth in the gross national product and the population explosion, (2) an explanation of pollution as a market externality, (3) the economic tools available for the government to "internalize" the pollution externality, and (4) a program for future action.
The economic issues involved in our environmental crisis are not straightforward, and solution to this crisis is not a "no-growth" economy or the punishment of public villains through oppressive regulations. The problem of pollution involves resource misallocation, insufficient price structures, and increasing population. Individuals should be charged for the use of a resource previously considered free. If the environment is to be preserved, a long-range program must be developed preferably at the regional level. In the long run, consumption and production patterns must be altered, and new institutional arrangements must be implemented.
[193 footnotes] FTP

9.19 UPTAKE AND METABOLISM OF DDT BY SIX SPECIES OF MARINE ALGAE

Rice, Clifford P., and Harish C. Sikka (Life Sciences Div., Syracuse University Research Corp., Syracuse, NY 13210)
Journal of Agricultural and Food Chemistry 21, No. 2, 148-152 (Mar.-Apr. 1973)

The purpose of this work was to examine the accumulation and metabolism of DDT by representative species of marine phytoplankton. The culture of algae were grown axenically (in pure cultures) on the R. R. L. Guillard and J. H. Ryder medium "f" [Can. J. Microbiol. 8, 229 (1962)] with the modification that glycylglycine (5 nM) was added as a buffer and the pH was adjusted to 7.5. The cultures were grown on a reciprocating shaker under controlled environmental conditions (14 hr. of light per day at 500 ft.-candles and at a temperature of 23°±1° C.). ^{14}C-DDT in acetone was added to the medium.

The uptake of DDT by the various marine algal species increased linearly with an increasing level of DDT, but increased nonlinearly with an increasing concentration of cells. The algal species having the higher numbers of cells per unit of mass took up greater amounts of DDT per unit weight than did the species with the lower number of cells. Some data are presented in the table that follows.

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9.19 MERCURY IN THE ENVIRONMENT

Lepple, Frederick K.
Sea Grant Publication DEL-SG-8-73, 75 pp. (Mar. 1973). College of Marine Studies, University of Delaware, Newark, DE 19711. Price not given.

The report is presented in two parts. Part I, entitled "A Global Review" is a survey of the basic properties of mercury and its compounds as related to their effects on various facets of the environment. Some of the topics discussed are the chemical forms of mercury, the hazards of mercury, incidents of mercury contamination, governmental standards and tolerance limits, levels of mercury in the atmosphere, biosphere, lithosphere, and hydrosphere, and the flow of mercury through each segment of the environment. The "mercury problem" is evaluated locally and globally. There is a comprehensive review of the accepted methods of analyses for mercury and its compounds.

Part II is a report on recent examinations of the mercury levels in the Delaware Bay region; the data are compared with those found in the waters and sediments from other areas.

[3 figures, 7 tables, 153 references] FTP

9.19 HEAVY METALS IN BRITISH WATERS
(1.0146)

Preston, A. (Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, United Kingdom)
Nature 242, No. 5393, 95-97 (Mar. 9, 1973)

The Ministry of Agriculture, Fisheries and Food has been conducting a program of research and development on heavy metals in the marine environment. The program has two objectives: continued monitoring of concentrations in food fish and shellfish relative to estimates of human intake, and information on geographical distribution, biological fate, and effect on marine resources.

The results of surveys of British coastal waters conducted in 1969, 1970, and 1971 indicated that in the areas of large industrial and urban development high values of heavy metals were found as follows: the eastern Irish Sea, Cu, Mn, Ni, Pb, and Zn; the Severn Estuary, Cd, Cu, Ni, and Zn; the northeast coast, Cd, Pb, and Zn; and the Clyde River in the vicinity of Hunterston, Cu, Mn, and Ni. The metal content of seaweed in these areas was used as the indicator. Comparison of these results with seaweed samples collected 10 years earlier from the same locations showed no differences in concentrations. In addition, the survey showed that the heavy metals were confined to a thin margin around the contaminated coastal areas with the concentrations attenuating seaward. The concentrations in the open Atlantic Ocean were similar to those in the Irish Sea and the North Sea. There was no difference in concentrations of heavy metals relative to depth in the Irish Sea: an indication of thorough mixing.

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9.2 SURVEY OF SELECTED RETAIL FOOD STORES HANDLING FISH IN CUYAHOGA AND SUMMIT COUNTIES, OHIO

Konopa, Leonard J. (Kent State University, Kent, OH 44242)
Institute for 21st Century Business, Center for Business and Economic Research, College of Business Administration, Kent State University, Kent, OH 44242 (Jan. 1973), 82 pp.

This report gives the results of a survey made of randomly selected food stores in Cuyahoga and Summit Counties, Ohio, as part of a program to examine the marketing and physical distribution of fish and fish products into the Midwest. The Contents consists of:

Nature of the Survey; Retail Survey Methodology; Description and Classification of the Stores; Form of Fish Handled by Size of Store; Percentage of Store's Sales by Form of Fish Handled; Retailer's Markup; Sources of Supply; Trends in Retailers' Fish Sales the Past Five Years; Retailers' Preference in Handling Fresh Versus Frozen Fish; What Type of Brand Names Appear on the Stores' Fish Products?; Promotional Practices; Retailers' Opinions of Who Buys Fresh, Frozen or Canned Fish and Reasons Why They Do; Procurement of Fresh Fish by Retailers; Problems of Retailers Handling Fish; and Suggestions to Improve Sales of Fresh Fish.

Suggestions of the retailers to increase the sale of fresh fish was one of the highlights of the report. Some of them are: (1) A consumer education program should be carried out on a national scale to point out the desirable food characteristics of fish, the nutritive value of fish, and how to prepare fresh fish properly. (2) Government authorities should cease frightening the public periodically with pollution-related matters that might unnecessarily affect the sale of fish.

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9.19 (1.0146)

Except in the case of shellfish, metal concentrations were not reflected in edible portions of fish. Concentrations in inshore species were sometimes higher than in offshore fish especially in Cd, Hg, and Pb.

The author suggests that metal pollution is a national or regional problem which can be monitored and controlled by the governments involved. Pollution by lead involves transport by winds and may require controls by agencies other than local government. The deep-sea dumping of waste is a minor contributor to metal pollution and is expected to be brought under international control soon.

In the future, monitoring of pollutants will be performed to provide a basis for determining those concentrations which are compatible with public health and marine resources maintenance.

[1 figure, 4 tables, 15 references] SW

9.2

(3) Retail stores should use first class, separate displays to promote the sale of fish; the displays should be pleasingly designed and decorated. (4) Methods should be developed to prolong the chilled shelf life of fresh fish. (5) Methods should be developed to reduce the odor of chilled fish and shellfish. (6) More efficient procedures should be adopted so as to reduce the price of fish and shellfish to the consumer. (7) Flexible pricing procedures should be used so that the better quality fish will command the higher price. (8) A more orderly and regular supply of fish to the market at a reasonable price should be developed. (9) A policy of compulsory grading should be instituted.

[26 tables] FTP

9.3 TOXICOLOGICAL EVALUATION AND FOOD INTAKE STUDIES AS FUNDAMENTALS FOR THE ESTABLISHMENT OF PERMISSIBLE MAXIMUM LEVELS OF CHEMICAL SUBSTANCES IN FOODS

Mollenhauer, P. H. (Bundesminist. Jugend. Familie Gesund., Bonn-Bad Godesberg, Germany)

Chemical Abstracts 78, No. 1, 276&p (Jan. 8, 1973)

9.19

Species of algae	Number of algal cells per ml. of culture	Size of algal cell (μ)	Uptake of DDT 2 hr. after treatment (ng. of DDT per mg. of dry weight)	Concentration factor (ratio of DDT in the cell to conc. of DDT in the culture)
Skeletonema costatum	1.19×10^6	7 by 14	13.4	26,300
Cyclotella nana	0.83×10^6	8 by 8	14.5	20,700
Isochrysis galbana	1.40×10^6	4 by 4	12.5	17,900
Olisthodiscus luteus	0.115×10^6	11 by 11	12.0	17,100
Amphidinium carteri	0.178×10^6	15 by 15	6.6	9,400
Tetraselmis chuii	0.134×10^6	9 by 14	4.0	5,700

Note: One ml. of cell suspension in each treatment contained 0.03 mg. (dry weight) of cells and 0.7 p.p.b. of DDT.

[4 figures, 3 tables, 14 references] FTP

9.2 (1.82) USE OF A COMMERCIAL DREDGE TO ESTIMATE A HARDSHELL CLAM POPULATION BY STRATIFIED RANDOM SAMPLING

Russell, Howard J., Jr. (Div. of Fish and Wildlife, Dept. of Natural Resources, Providence, RI 02903)

Journal of the Fisheries Research Board of Canada 29, No. 12, 1731-1735 (Dec. 1972)

In stratified random sampling to estimate clam population, the total number of samples and their locations are influenced by the results of a preliminary survey. The survey, by rocking-chair dredge, is used to locate concentrations of clam abundance on a chart of the area; information from the survey is translated into contours of abundance on the chart. Subsequent sampling, based upon areas between contours or strata, is then directed toward approaching equal sampling fractions. Results of the dredge hauls are also plotted at their positions on the chart.

The accuracy of the estimates is dependent on a good evaluation of the efficiency of the dredge, which is determined mainly by the degree of compaction of the substrate. Thus the types of sediment of a given study area must be known so that dredge efficiency can be evaluated. The rocking-chair dredge used in the study smoothed out the nonrandom distribution of the clam which allowed population estimation with only 18 dredge samples. The good agreement between estimates by stratified random sampling and catch per unit of effort data from the fishing fleet indicates that the estimates will be accurate enough for management of the clam fisheries. [2 figures, 1 table, 9 references] SW

9.2 PERCEPTIONS OF AND PREFERENCES FOR ALTERNATIVE CONVENIENCE FOODS

Doyle, Peter, and John McGee (London Graduate School of Business Studies)
Journal of the Market Research Society 15, No. 1, 24-34 (Jan. 1973)

During the past several years a variety of methods have been developed (factor analysis, discriminant analysis, cluster analysis, and others) for studying how different brands or products are evaluated by consumers. The subject is important to marketing management because successful methods would provide valuable information to product planning and promotional strategy. In this paper, the authors describe the application of another method--the use of nonmetric multidimensional scaling. A small sampling (26) of homemakers was used, and the technique was applied to the problem of examining consumers' preferences for and perceptions of alternative convenience food products. The idea of the method was that a metric attribute space can be developed from ordinary rankings of product similarities. Furthermore, the concept of a joint space was used to incorporate perceptual and preference data. Eight food products were considered in this analysis. An excellent statistical fit to the similarities data was provided by the mapping of respondent perceptions into a three-dimensional space.
[5 figures, 2 tables, 16 references] FTP

9.3 (9.17)(9.2) NORTHWEST ATLANTIC FISHERIES ARRANGEMENTS: A TEST OF THE SPECIES APPROACH

Christy, Francis T., Jr. (Resources of the Future, Washington, D.C.)
Ocean Development and International Law Journal 1, No. 1, 65-91 (Spring 1973)

In the current negotiations over the Law of the Sea, one important issue is the jurisdiction over and management of living resources. Presently, two chief alternative proposals are being advanced: (1) the economic zone approach and (2) the species approach. The first would provide the coastal States with exclusive rights to manage and dispose of the fisheries off their coasts out to a fixed distance or depth. The second would call for separate treatment of three kinds of fish namely, those that migrate widely, those that spawn in fresh waters, and those that generally remain in coastal waters. The management and distribution of stocks of coastal species would be handled by negotiation among interested parties on a stock-by-stock basis, with certain preferential rights given to the coastal State. However, the distinction between the economic zone and species approaches is not entirely clear, and they may overlap in several aspects. The species approach is now being tested in developments taking place within the Northwest Atlantic fisheries. The present article discusses the events now taking place concerning the developments in the Northwest Atlantic area; speculates about the effects of these developments with regard to the management goals of achieving a reduction in physical waste, in economic waste, and in management costs; and, finally, offers some conclusions concerning the viability of the species approach to the Law of the Sea.
(over)

9.2 ANTI-INTELLECTUALISM AND OTHER PLAGUES ON MANAGING THE FUTURE

Coates, Joseph F. (Office of Exploratory Research and Problem Assessment, National Science Foundation, Washington, D.C.)
Technological Forecasting and Social Change 4, No. 3, 243-262 (1973)

As society has become complex and integrated, the opportunities and needs to manage the physical and social technologies of society have become more urgent. Tools are developing that permit a more reliable anticipation and assessment of alternative futures. This paper discusses structural situations in our society that impede the effective management of the future. Some of these are (1) intellectual orientation of the intelligentsia, (2) a general ignorance of science and technology, (3) a failure to appreciate the strengths, functioning, and relationships of our political system, (4) lack of awareness of the intrinsic time constants of social change, (5) the substitution of piety for hard study, (6) a pervasive pessimism often grounded in ignorance, (7) special pleading of many interest groups, (8) lack of historical perspective, (9) a widespread aversion to social experimentation and a fear of new knowledge.

The purpose of this essay was to suggest the wide range of factors and forces that must be dealt with in a radical way if we are to effectively preserve and manage a socially and physically habitable world. A new frame of reference, a new systemic approach to the future, is suggested. The following should be adopted: (1) Use less piety and more profane study in the approach to societal issues; (2) Adopt new mechanisms for the study of societal issues; (3) Recognize that social
(over)

9.3 THE LAGGING LAW OF THE CONTINENTAL SHELF: SOME PROBLEMS AND PROPOSALS

Sutherland, Paul
Catholic University of America Law Review 22, No. 1, 131-155 (Fall 1972)

This comment discusses the problem of advancement of marine technology and the pace of legal developments relative to the continental shelf. The problems raised by the seabed law and technology will never be satisfactorily disposed of in a single remedial measure--a comprehensive and prospective international body of legislation must be formulated soon to avoid a crisis. At stake, the author indicates, are a tremendous resource, an unusual opportunity for development, and a whole new phase of international relations. Present law of the continental shelf is deficient in the areas of uniformity and foresight; it must be developed in anticipation of, rather than response to technology. The author believes that the Draft Convention, proposed by the United States in 1973, does not answer all the questions which have been raised in relation to seabed development, but it does provide a procedure for dealing with unresolved issues both now and in the future. To that extent,therefore, it is enormously significant.
[68 footnotes] FTP

9.2

Invention and institutional change are a major, self-conscious approach to societal problems (the author believes that institutional inventions will soon supercede physical-technological change in importance in managing society); (4) Recognize that centralized, long-range planning is a key to the successful operation of a highly integrated socioeconomy (Planning should be on a time scale of 10, 20, and 30 years; however, the planning need not be completely centralized--much of it could be done on regional and local scales with central coordination.); (5) Planning should be on a noncrisis basis--long-range planning would eliminate many crises and would open up new and effective alternatives for dealing with inevitably critical situations; (6) Focus on opportunities rather than on the usual addiction to problems; and (7) Recognize that everything is related to everthing else.
[36 references]
FTP

9.3 WHO OWNS THE OCEANS?

Knott, Richard C. (U.S. Navy, Washington, D.C.)
United States Naval Institute Proceedings 99, N. 3/841, 65-71 (Mar. 1973)

The author discussed various major law of the sea issues and the forthcoming Law of the Sea Conference.
FTP

9.2 [FISHING HARBOURS AND MARKETS IN VENEZUELA]
LOS PUERTOS PESQUEROS Y MERCADOS PORTUARIOS DE VENEZUELA

Turner, G. (Proy. Invest. y Desarrollo Pesquero MAC-PNUD-FAO, Apartado 2578, Caracas, Venezuela)
Inf. Tec. Proy. Invest. Desarr. Pesq., MAC-PNUD-FAO, Caracas, No. 49, pp. 5-46 (1972) 28 ref. (In Spanish)
Aquatic Sciences & Fisheries Abstracts 3, No. 1, 3Q809B, p. 178 (Jan. 1973)

The fishermen of Venezuela are dispersed among 300 (approx.) communities along the coast and rivers inland. Records of fish landing values and numbers of permits issued indicate that the income generated by more than half the registered vessels is less than 10,000 bolivars (about 30 US cents per bolivar); this income is paid out for the costs of the boat and the shares of the crew. The advantages to be gained by concentrating the vessels and fish landings at fewer sites along the coast are described. Factors to be considered in the selection of port sites and facilities are covered. Business methods are recommended to appraise port investment projects, to establish priorities, and to decide whether a capital outlay should be made. The application of benefit-cost analysis is suggested, using a procedure of discounting future cash flows. The present official policy of Venezuela regarding fishing ports is described.
SW

9.3 NEW CONCEPTS IN THE LAW OF THE SEA

Hargrove, John Lawrence (American Society of International Law, Washington, D.C.)
Ocean Development and Law Journal 1, No. 1, 5-12 (Spring 1973)

The current negotiations concerning ocean law show conflicts between two competing approaches; the first view is that the coastal State should control activities in any large adjacent ocean area, and the second view is that most of the ocean should be left open to the free use of all nations. The author believes both approaches are laissez-faire [characterized by a usual deliberate abstention from direction or interference], leave the distribution of benefits to arbitrary factors, and are based on national exclusivity.

This conflict manifests itself in international netogiations by competing claims regarding navigation, mineral resources, fishing, environmental protection, and strategic uses. A possible resolution of the conflicts has come forth through the concept of the whole ocean as a common resource of mankind in which no State has a right to benefit from the ocean except through arrangements sanctioned by the community, and rights to benefits are determined by membership in the community. The author suggests that such an approach would most likely produce a regime that would include (1) a narrow territorial sea with guarantees for various navigation; (2) a wide coastal band, in which the permanent managerial functions of the coastal State and a right to a large share of the proceeds of all commercial activities, will be coupled with permanent prerogatives of the international community; and (3) purely international management of the deep seabed.

(This paper is the text of a statement delivered by the author to the African States Regional Seminar on the Law of the Sea, Yaounde, Republic of Cameroon, in June 1972.)
FTP

9.3 (9.17)(9.2)

In the arrangements for the Northwest Atlantic fisheries, 15 nations agreed to divide up among themselves the annual yields of 14 separate stocks of fish. Also, it has been proposed that there be a limit on total amount of fishing effort and a division of the total among States. According to the author, the controls are based solely on the physical attributes of fishing and fail to take account of economic consequences. He concludes, therefore, that the proposed arrangements for the fisheries of the Northwest Atlantic will not succeed as an example of the species approach, because the physical approach to the resolution of fisheries problems is both unstable and inflexible. He believes that modifications of an economic nature will have to be adopted.
[21 footnotes]
FTP

9.3 DEVELOPMENT OF THE FREEDOM OF SCIENTIFIC RESEARCH ISSUE OF THE THIRD LAW OF THE SEA CONFERENCE

Knauss, John A. (Marine Affairs, University of Rhode Island, Kingston, R.I.)
Ocean Development and International Law Journal 1, No. 1, 93-120 (Spring 1973)

As a possible result of actions relating to resource jurisdiction and other issues at the forthcoming Law of the Sea Conference, it may be that the conduct of bona fide research in the ocean will become more difficult, and in some cases, even impossible. Many nations view ocean research as a threat to their economic and political security. This paper examines the nature of the problem and considers possible solutions. The author discusses the importance of scientific research and the benefits that accrue to all mankind, and he attempts to differentiate between such research and those activities directly related to resource exploitation. Concerns of the coastal States are examined and suggestions are made as to how some of the concerns might be alleviated. Also, the opinions and proposals of the scientific community are discussed. Finally, the author offers some specific treaty language. Appendix A is a copy of a proposed U.S. position, "Freedom for Science in the Oceans," prepared under the auspices of the Ocean Affairs Board of the National Academy of Sciences (Revised June 1972).
[2 appendixes] FTP

9.3 OCEAN SCIENCE AND MUTUAL ASSISTANCE: AN UNEASY ALLIANCE

Pontecorvo, Giulio (Graduate School of Business, Columbia University, New York, N.Y.)
Ocean Development and International Law Journal 1, No. 1, 51-64 (Spring 1973)

The current negotiations on the Law of the Sea also concern the question of freedom of scientific research in the oceans. A narrow definition of the territorial sea, favored by the major maritime States, enable ocean scientists to work reasonably freely throughout the world. However, two developments have taken place in the last 25 years or so that have begun to impinge on the freedom of the scientists to carry out their work. These are (1) the seaward extension of national jurisdiction and (2) the attitudes of certain developing countries toward the role of science in society. In this article, the author examines the assumption that mutual assistance programs are a way to maintain freedom of ocean science. Also, he examines the necessary conditions for operation of these programs, enumerates the costs associated with them, and suggests an approach for their implementation.
[8 footnotes] FTP

9.3 (9.19) MARINE POLLUTION: A CRITIQUE OF PRESENT AND PROPOSED INTERNATIONAL AGREEMENTS AND INSTITUTIONS -- A SUGGESTED GLOBAL OCEANS' ENVIRONMENTAL REGIME

Lanctot, Lawrence R. (University of San Francisco)
Hastings Law Journal 24, No. 1, 67-109 (Nov. 1972) (University of California, Hastings College of Law, 198 McAllister St., San Francisco, CA 94102)

The author discusses problems of seabed resource development and resulting marine pollution and reviews proposals for an international seabed regime. He concludes that the current proposals are inadequate, and he suggests an alternative. Control of marine pollution and the preservation of the ecosystems of the oceans can be accomplished only by an international regime with comprehensive jurisdiction over all the oceans. This regime must have the power to study, to define, and to stringently regulate man's use of the marine environment. It must be empowered to analyze pollution and to establish and enforce control standards. Such an institution could adopt, within a specific time-table, an ocean master plan including an inventory of ocean resources, an analysis of known pollutants, baselines, and standards for regulation. This plan would designate oceanic areas as to their suitability for particular purposes, including protection for the abundant "pastures" of the open sea.
[175 footnotes] FTP

9.6 FISH NUTRITION

Halver, John E. (Western Fish Nutrition Laboratory, Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Cook, Wash.)
Published by Academic Press, Inc., New York, N.Y. (1972), 713 pp. Price not given.

This book gives a general review of what is known about the nutritional requirements of fishes. It provides a concept of the similarities and differences between requirements of various types of fish and the established nutrient requirements of agricultural livestock. The subjects covered are well illustrated. Each chapter gives an extensive bibliography, and there is an author and subject index. There are 11 chapters, each written by an expert in the field. The chapter titles are as follows: "Calorie and Energy Requirements," p. 2; "The Vitamins," p. 30; "The Protein and Amino Acid Needs," p. 106; "Lipid Requirements," p. 145; "Non-nutrient Components of the Diet," p. 182; "Enzymes and Systems of Intermediary Metabolism," p. 256; "Feed Formulation and Evaluation," p. 327; "Salmonid Husbandry Techniques," p. 375; "Nutritional Fish Diseases," p. 404; "Nutritional Pathology," p. 439; and "The Diet and General Fish Husbandry," p. 540. SW

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Yoshioka, Masako	18	4.5
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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

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0.33 INHIBITION OF LECTINS BY ANTIFREEZE GLYCOPROTEINS FROM AN ANTARCTIC FISH

Chuba, Joseph V., and William J. Kuhns (Immunohematology Laboratory, Dept. of Pathology, New York University School of Medicine, New York, NY 10016), Ross F. Nigrelli, Jackie R. Vandenheede, David T. Osuga, and Robert E. Feeney
Nature 242, No. 5396, 342-343 (Mar. 30, 1973)

[A lectin is a substance that is not an antibody yet combines specifically with an antigen and produces phenomena resembling immunological reactions such as agglutination of red-blood cells. Lectins have been isolated from plants. Abstractor's note]

Reports of other workers indicated that certain Antarctic fish can resist freezing at ambient water temperatures of -1.9° C. This resistance to freezing is partly attributed to the presence in the serum of a group of "antifreeze" glycoproteins, which are composed of repeating units of the triglycopeptide, Ala-Ala-Thr-O-disaccharide. The disaccharide was identified by other workers as galactosyl-N-acetylgalactosamine. Three antifreeze active glycoproteins were isolated from blood serum of the fish Trematomus borchgrevinki and found to differ from each other only in polymer length. Two related glycoproteins were found that differ from the others in relative antifreeze activity. In attempts to study these glycoproteins, immunological techniques were applied, using horse antipneumococcal sera, with unsatisfactory results. Tests were then performed on the ability of the glycoproteins to inhibit plant lectin induced hemagglutination of various red-blood cells (human, Rhesus, sheep, and chicken). The results show that glycoproteins which were active in the antifreeze effect in fish serum were also active in

0.34 A PISCICIDAL CONSTITUENT OF SAPIUM JAPONICUM

Ohigashi, Hajime, Kazuyoshi Kawazu, Koichi Koshimizu, and Tetsuo Mitsui (Dept. of Food Science and Technology, Kyoto University, Kyoto and Dept. of Agricultural Chemistry, Okayama University, Okayama, Japan)
Agricultural and Biological Chemistry 36, No. 13, 2529-2537 (Dec. 1972)

A piscicidal constituent $C_{32}H_{42}O_8$ was isolated from S. japonicum, a tall deciduous tree commonly growing at the foot of mountains in Japan. Its formula is 12-O-n-deca-2,4,6-trienoyl-phorbol-(13)-acetate.

The piscicidal activity of the isolate and its derivatives were tested against killie-fish. The piscicidal activity of rotenone, callicarpone, huratoxin, and pentachlorophenoxide was compared to the isolate in a similar manner. The results showed that the isolate was four times as toxic as rotenone, and the toxicity was comparable to huratoxin which contains a diterpene part similar to the isolate. The monoacetate and hexahydro derivatives of the isolate were equally toxic.
[3 figures, 3 tables, 11 references] FTP

0.35 A REVIEW OF THE STUDIES ON THE SOLUBILITIES OF THE MUSCLE PROTEIN FRACTIONS

Ahmad, Hamid (Pakistan Council of Scientific and Industrial Research Laboratories, Lahore 16, Pakistan)
Science and Industry 9, Nos. 1-2, 9-19 (Jan.-Apr. 1972) (Published by the Pakistan Council of Scientific and Industrial Research, 39 Garden Road, Karachi 3, Pakistan)

Skeletal muscle constitutes the main part of the meat we eat and contributes more than 50% of the weight of an animal. Muscle proteins can be classified into three fractions based upon their solubilities. Those proteins soluble in water or dilute salt solution are called the sarcoplasmic proteins; those soluble only in concentrated salt solutions are called myofibrillar proteins; and those not soluble in water or concentrated salt solutions are the connective tissue and similar structures. The protein nitrogen distribution in the muscle runs about 36% in the sarcoplasmic protein, 58% in the myofibrillar protein, and 6% in the connective tissue protein. The sarcoplasmic proteins, consisting of myogens and globulins, are dissolved in the sarcoplasma of the muscle cell and constitute a complex mixture of some 50 components. Myofibrillar proteins are in the contractile apparatus of the muscle, and their major components are myosin, actin, and tropomyosin. The connective tissue proteins components include collagen, reticulin, and elastin.

This paper is a review of the literature dealing with the solubilities of the sarcoplasmic and myofibrillar protein fractions of muscle tissue. It contains

0.35 (7.67) EFFECT OF DIETARY VITAMIN E ON THE ACTIVITIES OF THE GLUTATHIONE PEROXIDASE SYSTEM IN RAT TISSUES

Chow, C. K., K. Reddy, A. L. Tappel (Dept. of Food Science and Technology, University of California, Davis, CA 95616)
Journal of Nutrition 103, No. 4, 618-624 (Apr. 1973)

Lipid peroxides are highly toxic and methods for their detoxification have focussed on α-tocopherol as an inhibitor of peroxidation. The effect of dietary α-tocopherol on activities of enzymes important in protection against lipid peroxidation was studied in tissues of rats. The activities of glutathione (GSH) peroxidase, GSH reductase and glucose-6-phosphate (G-6-P) dehydrogenase were significantly increased in perirenal adipose (PRA), paraepididymal adipose (PEA) and muscle, but not in liver, lung and kidney of animals fed a 15.7% tocopherol-stripped corn oil diet. The activities of GSH reductase and G-6-P dehydrogenase, but not GSH peroxidase, were also significantly increased in testes of rats fed the corn oil diets. Accumulation of fluorescent products (FP) in PEA and PRA of these animals was also increased. There are close linear relationships among these measurements. The increases in activities of the GSH peroxidase system in PEA, PRA, muscle and testes of rats fed the corn oil diets appear to be in response to the lipid peroxidation which occurred in these tissues. Except for muscle and testes, similar increases in the activities of GSH peroxidase and GSH reductase were found in tissues of rats fed a diet that contained 15.7% cod-liver oil.
Authors' abstract

0.35 (0.36) WAX ESTERS IN FISH: ABSORPTION AND METABOLISM OF OLEYL ALCOHOL IN THE GOURAMI (TRICHOGASTER COSBY)

Sand, D. M., C. H. Rahn, and H. Schlenk (Hormel Institute, University of Minnesota, Austin, MN 55912)
Journal of Nutrition 103, No. 4, 600-607 (Apr. 1973)

Absorption and subsequent metabolism of oleyl alcohol and oleic acid in the female gourami (Trichogaster cosby) were compared by feeding the 1-$^{3}H_2$- or U-^{14}C-labeled compounds. Lipids of intestines, blood, liver, body and roe were analyzed at time intervals over a period of 24 hours after ingestion. Absorption of both alcohol and acid was 60 to 70% of the amount offered. Alcohol was largely oxidized to acid in the intestinal tissue, but some of it was esterified to form wax ester. The relative extent to which these processes took place depended on the amount of alcohol fed. Dietary acid did not give rise to alcohol or wax esters in the intestines. Free alcohol did not enter the blood stream in any appreciable amount, but wax esters were found in the blood lipids. Some of these wax esters were deposited with body and roe lipids. Liver lipids, however, contained free alcohol besides wax ester which indicates that they are subject there to further metabolism probably involving oxidation of the alcohol moiety. The liver seems to have mainly a corrective function when the digestive and circulatory systems are overloaded with wax esters. Body wax esters are < 1% of the total body lipids in the gourami and intestinal wax esters are a major source for them. Roe wax esters are 85% of the roe lipids, but only a minor part of them orginates from intestinal wax esters. The greater portion of roe wax esters is synthesized in the roe where the chains of the dietary oleyl alcohol or oleic acid are used equally efficiently in spite of the intermediary oxidation of the former. Authors' abstract

0.35 IN VIVO INCORPORATION OF ^{3}H ARACHIDONIC ACID AND ^{14}C LINOLEIC ACID INTO LIVER LIPIDS FROM ESSENTIAL FATTY ACID-DEFICIENT RATS

Mercuri, Osvaldo, and Maria Elena De Tomás (Catedra de Bioquimica Instituto de Fisiölogia, Facultad de Ciencias Médicas, U.N.L.P., Calle 60 y 120, La Plata, Argentina)
Lipids 8, No. 3, 156-158 (Mar. 1973)

In earlier work on the in vivo incorporation of ^{14}C-linoleic acid into the liver lipids of essential fatty acid (EFA)-deficient rats, the authors found that the ^{14}C-linoleic acid is directed predominantly to the phospholipid fractions. Because arachidonic acid is considered the principal EFA, the authors examined, in the present study, the simultaneous incorporation of this acid and its precursor, linoleic acid, into the liver lipid of EFA-deficient rats. EFA-deficient rats were injected into the portal vein with a labeled solution containing ^{3}H arachidonic acid and ^{14}C-linoleic acid during a 1-min. period. The livers were then frozen and pulverized, and the lipids were extracted and fractionated by thin-layer chromatography. The amount of ^{3}H and ^{14}C incorporated into the liver lipids was measured, and the percent distribution of the radioactivity into the different lipid fractions was determined and compared with similar data obtained from normal rats. It was found that there was a statistically significant increase in the amounts of ^{3}H-arachidonic acid and ^{14}C-linoleic acid incorporated into the phospholipid fraction of the liver lipid from EFA-deficient rats over the amounts of these acids incorporated into the phospholipids of that of normal rats. The authors suggest that the reason for this increase could be a more active deacylation-reacylation cycle in EFA-deficiency.
[1 table, 19 references] FTP

0.33

inhibiting hemagglutination of the erythrocytes by lectins from two sources: Osage orange and castor bean. Those glycoproteins which were not active in antifreeze effect were markedly less active in hemagglutination inhibition. In comparative studies of inhibition using monosaccharides, these sugars inhibited Osage orange lectin hemaglutination in the following order of decreasing activity: N-acetyl-galactosamine, D-galactose, 2-deoxy-D-galactose, and alpha-methyl-D-mannoside. Activity of these sugars and the inactivity of 6-deoxy-D-galactose (which was also tested) indicates the likely participation in Osage orange lectin interactions of hydroxyl groups at the 3,4, and 6 carbon positions of the terminal D-galactosyl residues of the active glycoproteins. The activity of the glycoproteins for inhibiting the lectin and their activity for depressing the freezing point in fish seem to depend on regular spacings of the disaccharides along the peptide chain of the glycoprotein structure. The authors suggest that the lectin assay provides a micro method for determining the amounts of glycoprotein in tissues and fluids of polar fish.
[1 table, 16 references] SW

0.35

two tables that summarize the methods used for extracting the proteins from muscle. The first table deals with the extraction of sarcoplasmic proteins and the second with myofibrillar proteins; both list buffer systems used, pH of extracting solution, temperature of extraction, time of extraction, and the literature reference source.
[2 tables, 44 references] FTP

0.33 KINETICS OF SYNTHESIS OF PROTEIN MEMBRANES GAS VACUOLES OF MICROCYSTIS AERUGINOSA (BLUE-GREEN ALGA)

Lehmann, Heiner (Bot. Inst., Tieraerztl. Hochsch., Hanover-Kirchrode, Germany)
Chemical Abstracts 77, No. 17, 111731y (Oct. 23, 1972)

0.35 FREE FATTY ACID METABOLISM DURING STRESS: EXERCISE, ACUTE COLD EXPOSURE, AND ANAPHYLACTIC SHOCK

Paul, Pavle, and William L. Holmes (Division of Research, Lankenau Hospital, Philadelphia, PA 19151)
Lipids 8, No. 3, 142-150 (Mar. 1973)

Tissues, particularly the muscle, can take up and oxidize free fatty acid (FFA) and, also, the FFA has a rapid turnover rate; thus, glucose and FFA play an important role in energy metabolism. Glucose and FFA are metabolized from energy depots in the body and delivered to their sites of utilization via the circulatory system. In earlier work, the senior author found that animals exercising at different work loads but at equivalent plasma FFA concentrations have an increased rate of FFA turnover and percentage of FFA uptake immediately oxidized at the higher workloads. Apparently, metabolic rate is also one of the factors to be considered when evaluating FFA metabolism. Plasma FFA is the most important energy yielding substrate for most animal tissues, and its mobilization is under sensitive hormonal control. In the present study examination was made of FFA metabolism under different metabolic conditions of physiologic stress of exercise or acute cold exposure and on the pathologic stress of anaphylactic shock. These data were compared with those obtained in normal animals surgically deprived of their pancreas or thyroid or infused with lactic acid, norepinephrine, or nicotinic acid (agents which affect lipid metabolism). The rates of turnover and oxidation of plasma FFA were determined in unanesthetized dogs with the aid of a technique involving continuous infusion of albumin-bound palmitate-1-^{14}C and the simultaneous measurement of O_2 uptake, CO_2 output, and specific activities of CO_2 and FFA.

0.36 (9.19) THE ABSORPTION AND METABOLISM OF ARSENIC IN FISH

Lunde, Gulbrand (Central Institute for Industrial Research, Blindern, Oslo, Norway)
Fiskeridirektoratets Skrifter Serie Teknologiske Undersøkelser (Reports on Technological Research concerning Norwegian Fish Industry) 5, No. 12, Directorate of Fisheries, Bergen, Norway (1972), 16 pp.

In earlier work, the author showed that fish contain arsenic compounds in the form of lipid soluble and of water-soluble arseno organic compounds. Certain single-celled algae are able to synthesize lipid soluble and water-soluble arseno organic compounds. It is possible that these organisms might be the source of the arseno organic compounds in the marine food chain (in fish, shrimp, and other invertebrates). However, if arsenic occurs in compounds that are essential to fish, it is possible that fish are able to synthesize these compounds. Such information would be useful from a biological point of view and in connection with arsenic containing pollution and waste. In the present study, the author examined the absorption and metabolism of inorganic arsenic in rainbow trout by use of radioactive tracers. In one series, the arsenic was mixed with the feed of the trout, and in another series the arsenic was added to the water.

Fish will absorb inorganic arsenic when it is mixed into the feed, and will synthesize lipid soluble and water-soluble arseno organic compounds. The absorption of inorganic arsenic seems to depend upon the quantity of arsenic present in the fish; the absorption decreases as the concentration of arsenic in the fish increases. When radioactive arsenic (As-74) is added to the water, absorption

0.38 (1.88) GENETIC VARIATION IN A GRADIENT OF ENVIRONMENTAL VARIABILITY: MARINE BIVALVIA (MOLLUSCA)

Levinton, Jeffrey (Dept. of Earth and Space Sciences, State University of New York, Stony Brook, NY 11790)
Science 180, No. 4081, 75-76 (Apr. 6, 1973)

A belief held by selectionists (those who consider natural selection a fundamental factor in evolution) is that varying and heterogeneous environments (such as a habitat with a wide range in depth, temperature, salinity, light, and other factors) should support species that are more polymorphic (species containing morphologically different individuals). In contrast, monotonous environments (such as the deep-sea bottom) should support monomorphic species.

Many other studies have indicated correlation of allele (one of a pair of genes at loci of a chromosome which give rise to different characteristics) frequencies with environmental heterogeneity which suggest an adaptive significance in agreement with the selectionists.

To relate genetic variability to environmental variability six bivalve mollusk species were studied at two enzyme synthesizing loci. The results indicate that the number of alleles decreased as the depth increased at which the mollusks were taken; that is, the enzyme synthesizing capability decreased at the greater depth (the more constant the environment). The author concluded that environmental variability regulates genetic variability at the two enzyme synthesizing loci of the molluscan chromosomes.
[2 tables, 23 references] SW

0.39 FOOD PARTICLES AS A SITE FOR BIOHYDROGENATION OF UNSATURATED FATTY ACIDS IN THE RUMEN

Harfoot, Christopher G., Raymond C. Noble, and John H. Moore (Hannah Research Institute, Ayr Ka6 5HL, United Kingdom)
Biochemical Journal 132, No. 4, 829-832 (Apr. 1973)

The conversion to stearic acid (an 18 carbon, saturated fatty acid) from C_{18} polyunsaturated fatty acids, via several intermediates, in the rumens of cattle and sheep was reported by other workers. In this process, the relative activity of the major components of the rumen contents--bacteria, protozoa, cell-free supernatant, and fine food particles--is not known. To illuminate the action of these major components, experiments were performed with the contents of sheep rumen and linoleic acid, a polyunsaturated, 18 carbon fatty acid designated $C_{18:2}$.

Rumen contents from four sheep were strained, pooled, and diluted eight times with a buffer solution (gassed with hydrogen and nitrogen to displace oxygen) and distilled water. Sucrose and ammonium carbonate were added as carbon, energy, and nitrogen sources. The mixture was fractionated by centrifugation into a cell-free component, a component containing either bacteria or protozoa, and a component containing only fine food particles. The fractions, and a portion of the whole mixture, were incubated with linoleic acid and tested for C_{18} acid and intermediates over a 6-hr. period. The results show that about 90% of linoleic acid was utilized in the whole mixture, in the first hour of incubation. Transient production of the intermediates $C_{18:2}$ cis-9-trans-11 conjugated dienoic acid, followed by $C_{18:1}$ trans-11 acid was found. Rapid conversion to stearic acid ($C_{18:0}$) completed the reaction. Stearic acid accounted for about 65-70% of the linoleic acid added. In

0.36 (9.19)

of arsenic appears to take place through the skin and gills of the fish; this absorption (as far as could be determined by the methods used in the study) does not result in the formation of arseno organic compounds. When radioactive arsenic is mixed in the feed (and absorbed through the digestive tract) arseno organic compounds are synthesized and accumulated in the eyes, throat, gills, and certain internal organs of the fish.
[8 figures, 8 references]

FTP

0.36 EFFECT OF TEMPERATURE ACCLIMATION UPON SUCCINIC DEHYDROGENASE ACTIVITY FROM THE EPAXIAL MUSCLE OF THE COMMON GOLDFISH (CRASSIUS AURATUS). II. LIPID REACTIVATION OF THE SOLUBLE ENZYME (0.38)

Hazel, Jeffrey R. (Dep. Physiol. Biophys., Univ. Illinois, Urbana, Ill.)
Chemical Abstracts 78, No. 5, 25752v (Feb. 5, 1973)

0.35

The results indicate that FFA mobilization and FFA utilization is affected by the different metabolic states induced by stress. FFA mobilization increases during physiological stress; the amount of FFA oxidized depends upon the amount mobilized and upon the metabolic rate of the tissue using FFA as an energy substrate. FFA mobilization is inhibited and FFA utilization is depressed during the stress of anaphylactic shock. When the mobilization of FFA is raised to a normal range with norepinephrine or by increasing the energy demand with exercise, the FFA oxidation rate is not affected.

Apparently, the rate of delivery of energy from the substrate to the tissues by the circulation and by the oxidative system in these tissues are of equal importance for our biological survival under basal conditions; under stress they play an even more significant role.
[4 tables, 22 references]

FTP

0.39

incubations of the fractions of rumen content, major conversion of $C_{18:2}$ acid to C_{18} acid (or hydrogenation) took place in the food particle fraction. Less than one-third of the conversion took place in the bacteria, protozoa, or cell-free fractions. The authors suggest that this work provides evidence of an extracellular hydrogenation process that follows extracellular lipolysis of esterified lipids in the rumen.
[2 tables, 9 references]

SW

0.36 THE USE OF RADIOACTIVE ISOTOPES TO MEASURE THE TRANSFER OF MATERIALS IN AQUATIC FOOD CHAINS

Conover, R. J., and V. Francis (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute, Dartmouth, Nova Scotia, Canada)
Marine Biology 18, No. 4, 272-283 (Feb. 1973)

Isotopic tracers have been used extensively over the past 20 years in the study of transfer processes in aquatic ecosystems. Further, physiologists and biophysicists have used isotopic techniques to study transfer processes within organisms and organ systems. The authors state that ecologists are not aware of the related literature that has been generated; consequently, their use of isotopes is naive. The authors further suggest that the majority of published work dealing with the uptake of a radioactive tracer to estimate feeding or incorporation rates probably contains erroneous information. The experimenters were in error because of apparent misunderstanding of basic tracer theory and the limitations of the method.

Unless it is known that no recycling of isotope has occurred during an experiment, the assumption of linear uptake when the system is not linear, even over short periods, can lead to significant errors in the estimation of ingestion. If the experiments are designed in which the test organism sums or integrates the maximum number of rate processes, following the uptake or loss of an isotope as a function of time can be greatly simplified. If a food supply is uniformly labeled, the rate of change of tracer can be used to give a rate of ingestion. If a predator is labeled before the experiment, the rate of loss of its isotope burden can be used to determine metabolism. The authors show various models of interaction between organisms, environment, and food to describe the recycling of isotopes and how to manage the information to provide valid results.
[5 figures, 4 tables, 29 references]

SW

0.39 THE EFFECT OF GLUCOSE, INSULIN AND NORADRENALINE ON LIPOLYSIS, AND ON THE CONCENTRATIONS OF ADENOSINE 3′:5′-CYCLIC MONOPHOSPHATE AND ADENOSINE 5′-TRIPHOSPHATE IN ADIPOSE TISSUE

Knight, Brian L., and Jill Iliffe (Medical Research Council Lipid Metabolism Unit, Hammersmith Hospital, Ducane Road, London W12 OHS, United Kingdom)
Biochemical Journal 132, No. 1, 77-82 (Jan. 1973)

Other workers have reported that glycerol production decreased during the incubation of adipose tissue with adrenaline in the presence of insulin without glucose. Under the same conditions but with insulin and glucose and glucose alone, production of glycerol increased. Glycerol release is suggested as an indication of lipolytic activity in the tissue; further, glucose can overcome the antilipolytic effect of insulin and increase lipolysis in adipose tissue. Additionally, hormonal stimulation of adipose tissue lipase is mediated by 3′:5′-cyclic monophosphate (cyclic AMP); and the antilipolytic effect of insulin is related to a decrease in the concentration of cyclic AMP. The authors tested the possibilities that glucose could influence lipolysis by changing the intracellular concentrations either of cyclic AMP or adenosine 5′-triphosphate (ATP) (ATP is required for the stimulation of adipose tissue lipase).

Glycerol production and tissue concentrations of ATP and cyclic AMP were followed during the incubation of rat adipose tissue with and without glucose, insulin, and the hormone noradrenaline. The results indicate that glucose inhibited a decrease in lipolysis, as indicated by the rate of glycerol release, and had no

0.5 (2.3) ENTEROPATHOGENIC E. COLI--A NEW PROBLEM FOR THE FOOD INDUSTRY?

Insalata, Nino F. (Post. Div. Microbiological Research, General Foods Corp., 275 Cliff St., Battle Creek, MI 49016)
Food Technology 27, No. 5, 56, 58 (May 1973)

Recent outbreaks of food poisoning associated with enteropathogenic strains of Escherichia coli point out the need for members of the food industry to be aware of enteropathogenic E. coli (EEC) as a potential problem and to establish means of monitoring and controlling the organism in foods. This article gives some background information on EEC organisms and offers some approaches to establishing a control program. Many questions regarding EEC organisms in food remain unanswered. Some of these are: (1) What is the incidence of EEC in foods? (2) Are EEC organisms part of the natural microflora of foods or are they contaminants? (3) Are EEC organisms truly primary pathogens? (4) If EEC are truly pathogens, what is the tolerance level in humans? (5) For each food, how many organisms are required by a susceptible host to produce clinical symptoms? and (6) What problems may arise in isolating and typing the organisms? The answers to these and many other questions must be considered as prerequisites to the establishment of a control program.
[5 references] FTP

0.39 PREPARATION OF HIGH-MOLECULAR-WEIGHT DNA FROM FISH SPERM

Christen, Karl (Rephamac A.-G.) (pat.)
German Offen. 2,217,911 (Nov. 9, 1972)
Chemical Abstracts 78, No. 5, 26130c (Feb. 5, 1973)

0.5 SENSITIVITY OF VIBRIO PARAHAEMOLYTICUS TO COLD IN OYSTERS, FISH FILLETS AND CRABMEAT

Johnson, Howard C., and J. Liston (Institute for Food Science & Technology, College of Fisheries, University of Washington, Seattle, WA 98195)
Journal of Food Science 38, No. 3, 437-441 (Mar.-Apr. 1973)

V. parahaemolyticus, a halophilic food poisoning organism, in laboratory media is sensitive to heat (killed at 60° C. for 5-15 min.) and to cold (dies out at temperatures below 6°-8° C.). Recently, the organism was isolated from samples of refrigerated and frozen market food. Thus, the organism may survive better in foodstuffs. The purpose of the present study was to find out if foodstuffs offer this protection. Strains of V. parahaemolyticus and V. alginolyticus were inoculated into shucked oysters, crab meat, and fish fillets; the samples were packaged in Polymylar pouches. Also, depurated live oysters were contaminated directly by exposing them to sea water containing V. parahaemolyticus. The test oysters were then shucked aseptically and packaged in the pouches. The oysters were stored at 11°, 8°, 5°, 1°, -15°, and -30° C.; the fish fillets and crab meat were stored at 1°, -15°, and -30° C. Samples from each lot were removed from storage at periodic intervals and the numbers of surviving organisms were determined, using selective and nonselective media. The total test period was 130 days.

In the oysters, the counts of the two organisms decreased during storage, but viable organisms could be detected up to 40 days in samples stored at 1° C. and up to 130 days in samples stored at -15° and -30° C. In the fish fillets, viable

0.4 LEARNING: CLASSICAL AND AVOIDANCE CONDITIONING IN THE MOLLUSK PLEUROBRANCHAEA

Mpitsos, George J. (Hopkins Marine Station, Pacific Grove, CA 93950), and William J. Davis (Thimann Laboratories, University of California, Santa Cruz, CA 95060)
Science 180, No. 4083, 317-320 (Apr. 20, 1973)

The cellular processes that underlie learning are mostly not known, partly because appropriate experimental preparations have not been developed. These preparations, the authors indicate, must be capable of learning and must be susceptible to analysis on the level of single nerve cells. The gastropod mollusks may be used for such studies because their neuronal circuitry underlying simple behavioral acts can be comprehensively analyzed to provide background information for cellular studies of complex behavior phenomena. Also, gastropods appear to be capable of learning.

In the present study the researchers found that the feeding behavior of the carnivorous marine gastropod P. californica can be conditioned, and that the effects of this conditioning can be detected in the isolated nervous system. These initial electrophysiological results seem to indicate that the cellular basis of associative learning can be studied further in Pleurobranchaea.
[2 figures, 19 references] FTP

0.5

organisms were detected after about 60 days in the samples stored at -15° and -30° C. and after 15 days in those stored at 1° C. In the crab meat, viable organisms were detected after about 30 days in those samples stored at 1°, -15°, and -30° C. Thus, V. parahaemolyticus could survive in contaminated seafoods during normal conditions of commercial handling.
[3 figures, 4 tables, 24 references] FTP

0.6 GRANULAR PROTEIN CONTAINING FOOD PRODUCT RESEMBLING THE NATURAL CAVIAR OF STURGEON, SALMON AND OTHER FISH, AND A METHOD OF PREPARING SAME

Solonimsky, Grigory Lvovich, Vladimir Borisovich Tolstoguzov, Vera Alexandrovna Ershova, and Dmitry Borisovich Izjumov (Moscow, U.S.S.R.); assignors to Ordena Lenina Institute Elementoorganischeskikt Soedinenj, Moscow (pat.)
U.S. Patent 3,717,469
Official Gazette of the U.S. Patent Office 907, No. 3, 764 (Feb. 20, 1973)

This granular food product, resembling natural caviar, contains an aqueous colloidal solution of proteins, gelatin, ions of alkaline earth metals, polysaccharides capable of forming ionotropic gels when interreacting with the stated ions, and vegetable tannins. FTP

0.39

effect on concentrations of cyclic AMP. The authors suggested that glucose stimulates ATP production which removes free fatty acids, but this reaction alone does not affect lipolysis. The authors further suggest any effect of glucose upon lipolytic activity involves the influence of ATP, metal ions, and free fatty acids.
[4 figures, 32 references] SW

0.39 BIOSYNTHESIS OF ASTAXANTHIN. V. INTERCONVERSION OF THE ALGAL CAROTENOIDS OF STIGEOCLONIUM INTO FISH CAROTENOIDS OF FANCY RED CARP

Katayama, Teruhisa, Haruhiko Tsuchiya, and C. O. Chichester (Fac. Fish., Kagoshima Univ., Kagoshima, Japan)
Chemical Abstracts 78, No. 1, 2151j (Jan. 8, 1973)

0.6 (0.8)(9.6) PRINCIPLES OF PACKAGE DEVELOPMENT

Griffin, R. C., Jr., and S. Sacharow
Avi Publishing Co., P.O. Box 831, Westport, CT 06880.(1972), 321 pp. Price $17.00; foreign $18.00.
Burton R. Lindquist (reviewer) (Packaging Research & Development, Armour Food Company)
Food Technology 27, No. 5, 170 (May 1973)

A broad overview of packaging and the principles of packaging are presented in this book. The book is divided into two parts. The first part deals with basic principles and covers history, relationship of packaging development to production and marketing needs, packaging materials and forms, and package testing. The second part deals with the development process and covers manufacturing, equipment, marketing, government regulations, and ecological considerations. Included is a discussion of the function of packaging in feeding the hungry world.
FTP

0.7 QUANTIFICATION OF LOWERED CHOLESTEROL OXIDATION IN GUINEA PIGS WITH LATENT VITAMIN C DEFICIENCY

Ginter, E., R. Nemec, J. Červeň, and L. Mikuš (Institute of Human Nutrition Research, Bratislava, Czechoslovakia)
Lipids 8, No. 3, 135-141 (Mar. 1973)

The purpose of this study was to determine the transformation of 26-^{14}C-cholesterol to bile acids in normal and in vitamin C-deficient guinea pigs by measuring the $^{14}CO_2$ output and cholesterol specific activity. Male guinea pigs were fed a scorbutigenic diet and then were divided into a control group (fed 10 mg. ascorbic acid per animal per day) and a group with latent vitamin C deficiency (2 weeks on the scorbutigenic diet, followed by a maintaining dose of 0.5 mg. ascorbic acid per animal per day). After 13 weeks (the animals weighed 500 g. and their weight curves had leveled off), 26-^{14}C-cholesterol was administered intraperitoneally to all the animals. The ^{14}C excretion in the expired CO_2 and the urine and the cholesterol specific activity in the blood serum and liver were examined at intervals of 24 hr. and 1, 3, 5, 7, 9, and 11 weeks.

The ascorbic acid level in the liver and spleen of the control group of guinea pigs was five times higher than that in the vitamin C-deficient animals; the total cholesterol level in the serum and liver was higher in the vitamin C-deficient animals. The size of the cholesterol pool (blood and tissues with rapid cholesterol exchange) was greater in the vitamin C-deficient guinea pigs. Latent vitamin C-deficiency caused a slowing down of the rate of transformation of cholesterol to bile acids. There was a correlation between the liver ascorbic acid level and the rate of cholesterol transformation to bile acids.

0.7 TRACE MINERALS IN FOODS: NUTRITIONAL-TOXICOLOGICAL PROBLEMS

Fox, M. R. Spivey, and Helen Reynolds (Bureau of Foods, Food and Drug Administration, Washington, D.C.)
Feedstuffs 45, No. 13, 30, 51 (Mar. 26, 1973)

This article is one of the papers presented at the 1972 Animal Nutrition Research Council meeting.

The potential for contamination of the food supply with excessive inorganic elements has increased in level and diversity as industrialization advances in civilization. More information is required and the practical significance must be determined of the levels of toxic elements in foods. In the absence of information on a toxic form of an element, the levels of selected elements in foods should be monitored to generate information which will help to identify problems. Monitoring programs have been undertaken by the Food and Drug Administration (FDA). Diet composites are being analyzed for mercury, cadmium, arsenic, lead, selenium, zinc, and pesticides.

The interrelation between toxic elements and essential nutrients have two characteristics in man: (1) Inadequate intake of an essential nutrient may increase the adverse effects of a toxic element, and (2) an excess intake of an essential nutrient may be protective against a toxic element.

An FDA diet survey indicated that the cadmium intake of an adult man would be 30 µg. per day. Other reports showed that an adult man would be exposed to cadmium per day at the rate of 50 mg. in food, 10 mg. in water, and 20 mg. in 20 cigarettes. Some foods accumulate cadmium per 100 g. serving as follows: oysters

0.7 (4.6)(7.67) EFFECT OF VITAMIN E AND SELENIUM ON TISSUE ANTIOXIDANT STATUS OF RATS

Chen, Linda H. (Dept. of Nutrition and Food Science, University of Kentucky, Lexington, KY 40506)
Journal of Nutrition 103, No. 4, 503-508 (Apr. 1973)

Two animal experiments were performed with weanling, male, Sprague-Dawley rats to study the relationship of vitamin E and selenium on tissue antioxidant status. In experiment 1, 60 rats were fed basal diets supplemented with gradient levels of vitamin E. Sodium selenite (Se 1 ppm) was added to the diets of half the rats. In experiment 2, 48 rats received diets containing selenium (1 ppm) as sodium selenite, selenomethionine or selenocystine, with or without supplementation of vitamin E. After 4 weeks, liver peroxidation was determined by thiobarbituric acid (TBA) assay. Dietary selenium compounds as well as vitamin E lowered TBA values ($P < 0.01$). Sodium selenite at 1 ppm was as effective as 15 IU/kg diet of vitamin E in decreasing the peroxidation of liver lipids. The three selenium compounds were not significantly different in their effect. Vitamin E, sodium selenite, glutathione, ascorbic acid and butylhydroxyanisole added in vitro lowered TBA values of vitamin E-deficient rat liver homogenate, whereas methionine, selenomethionine and selenocystine added in vitro increased the TBA values. It is suggested that metabolites of dietary selenomethionine, selenocystine and methionine improved tissue antioxidant status of rats. Author's abstract

0.7 EFFICIENCY OF TRANSFER OF POLYUNSATURATED FATS INTO MILK

Bitman, Joel, L. P. Dryden, H. K. Goering, T. R. Wrenn, R. A. Yoncoskie, and L. F. Edmondson (Animal Physiology and Genetics Institute, Nutrition Institute and Dairy Products Laboratory, U.S. Dept. of Agriculture, Beltsville, MD 20705)
Journal of the American Oil Chemists' Society 50, No. 3, 93-98 (Mar. 1973)

T. W. Scott and his associates [Aust. J. Sci. 32, 291 (1970) and JAOCS 48, 358 (1971)] developed a technique by which the polyunsaturated fat content of milk was increased by feeding cows polyunsaturated oils encased in a formaldehyde-protein coat. The formaldehyde-protein coating is stable in the rumen where, by the action of microorganisms, lipolysis and hydrogenation occur and the polyunsaturated fatty acids are converted to saturated fatty acids. But, when the formaldehyde-protein coated polyunsaturated fats pass on to the abomasum (pH 2-3), the coating is hydrolyzed and the polyunsaturated fatty acids are then absorbed and transferred into the milk. The present study examined the efficiency of transfer of the polyunsaturated fats into milk when two different techniques were used to protect the unsaturated fats fed to the cows: (a) the Scott et al. encapsulation procedure and (b) treatment of soybeans with formaldehyde.

The encapsulated polyunsaturated fat particles were prepared by adding formaldehyde to a homogenate of safflower oil and 12.5% sodium caseinate and then spray drying the mixture. The treated particles contained 58% safflower oil, 40% casein, and 2% formaldehyde. The soybean particles were prepared by incorporating formaldehyde into soybeans, full-fat soy flour, or full-fat soy flakes. The safflower

0.7

NITRITE-INDUCED METHEMOGLOBINEMIA IN GUINEA PIGS: INFLUENCE OF DIETS CONTAINING BEETS WITH VARYING AMOUNTS OF NITRATE, AND THE EFFECT OF ASCORBIC ACID, AND METHIONINE

Stoewsand, G. S., J. L. Anderson, and C. Y. Lee (Dept. of Food Science and Technology, New York State Agricultural Experiment Station, Cornell University, Geneva, NY 14456)
Journal of Nutrition 103, No. 3, 419-424 (Mar. 1973)

Experiments were conducted with young, male guinea pigs to investigate the influence of feeding a vegetable with naturally occurring low and high amounts of nitrate, and the influence of dietary supplementation of ascorbic acid and methionine on nitrite-induced methemoglobinemia. Freeze-dried red table beets were incorporated into experimental diets. They contained either a low or high amount of nitrate from manipulation of nitrogen fertilization rates during their growing period. High nitrate-containing beet diets, or nitrate added to diets, did not induce methemoglobinemia. High nitrate diets fed to guinea pigs enhanced nitrite-induced methemoglobinemia. Low nitrate-containing beet diets seemed to "protect" guinea pigs from nitrite toxicosis. Purified diets containing 1% added L-ascorbic acid slightly reduced nitrite-induced methemoglobin blood levels of normal guinea pigs compared to those fed 0.02% ascorbic acid, but there was an additional 50% reduction when 1% methionine and 1% or 2% ascorbic acid were included in the diet.
Authors' abstract

0.7

oil-protein particles or soybean preparations were fed to Holstein cows as a partial replacement of grain on a weight by weight basis. The standard rations consisted of medium quality orchardgrass hay and a mixed concentrate.

The efficiency of transfer of dietary 18:2 fatty acids ranged from 17% to 42% for the safflower oil-casein-formaldehyde preparations and from 2% to 8% for the soybean particles preparations (% transfer = 18:2 fatty acid content of the milk fat per dietary 18:2 fatty acids times 100). The 18:2 fatty acid content of the milk fat increased from basal levels of 2-3% of total fatty acids to 35% with certain safflower oil-casein-formaldehyde particles supplements and 7% with soybean particles supplements. The fatty acids that showed compensatory declines were palmitic (16:0), which decreased from 35% to 14%, and myristic, which decreased from 13% to 4%, as the safflower oil-protein formaldehyde supplement level increased from 0 to 2,278 g. per day in the diet of the cows. The blood cholesterol, triglycerides, and nonesterified fatty acids all increased markedly when the cows were fed increasing amounts of safflower oil-protein-formaldehyde supplements. The cholesterol content of the milk did not increase.
[9 figures, 4 tables, 11 references] FTP

0.7

The results indicate that ascorbic acid is necessary for a normal course of cholesterol catabolism. Also, in latent vitamin C deficiency, the rate of cholesterol catabolism slows down and cholesterol accumulates in the blood and liver of vitamin C-deficient guinea pigs.
[2 figures, 3 tables, 33 references] FTP

0.7

52 µg., clams 40 µg., beef liver 24 µg., and beef kidney 48 µg. Studies of dietary cadmium in quail show that as cadmium was increased, interference was observed in absorption of required minerals.

In studies of elements in diets, the authors suggested the formulation of one reference control diet that would permit comparisons among laboratories and serve as the prototype for subsequent reference diets.
[3 tables, 12 references] SW

0.7 EFFECT OF DIETARY EXCESSES OF LYSINE AND ARGININE ON THE DEGRADATION OF LYSINE BY CHICKS

Wang, Shu-Heh, L. O. Crosby, and M. C. Nesheim (Dept. of Poultry Science and Graduate School of Nutrition, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 103, No. 3, 384-391 (Mar. 1973)

The factors influencing lysine degradation were investigated by studying the level of liver lysine-ketoglutarate reductase (the initial degradative enzyme) and the conversion of ^{14}C-lysine to $^{14}CO_2$ in the intact chick. Liver lysine-ketoglutarate reductase activity was increased by excesses of dietary lysine, but not arginine, and kidney arginase activity was increased by excesses of both arginine and lysine. The rate of ^{14}CO production from ^{14}C-lysine in vivo correlated with the lysine-ketoglutarate reductase activity measured in vitro when a loading dose of lysine was given. No correlation was observed when a trace dose was given. The rate of lysine oxidation was stimulated by lysine, but excesses of dietary arginine did not increase lysine oxidation. Genetic differences in lysine-ketoglutarate reductase and the rate of ^{14}C-lysine oxidation were observed between the high arginine and low arginine requirement strains. These findings suggest that the rate of lysine oxidation in vivo may be regulated by the lysine pool at low levels of dietary lysine, and by the level of degradative enzyme at high levels of dietary lysine. Authors' abstract

0.8 (2.3) GEOMETRY OF CIRCULAR CUTTER AND ITS INFLUENCE ON SPECIFIC CUTTING FORCE OF FISH RAW MATERIAL

Kawka, Tadeusz (Institute for Exploitation of Sea Resources, Szczecin, ul. Kazimerza Królewicza 4, Poland)
Acta Ichthyologica et Piscatoria 2, No. 1, 141-150 (1972) Szczecin, Poland

The author investigated the relation of circular cutter geometry to specific cutting force in the cutting of fish. The results indicated that the value of blade angle has an influence on cutting force in a linear relation: the lower the angle of the blade, the lower the specific cutting force. In addition, a cutter ground on both sides allowed the cutting force to be decreased about 10% from that found necessary for a cutter ground on one side. There was a limit to which the angle of the blade could be reduced; a cutting angle below 10°-15° caused early blunting of the edge. A cutting angle of 20° was found to be best. It was further found that the cutting force required by a plain, disc-shaped blade could be reduced about 15% by removing cut-outs evenly spaced around the circumference. Other information gained indicated that cutting force depends on the species of fish and condition.

For example, the specific cutting force required for Norway haddock is three times higher than for mackerel. The cutting force necessary for fresh fish is higher than for thawed fish. The coarseness or fineness of scales and the toughness of muscle, fresh and thawed, are influencing factors also.
[7 figures, 5 references] SW

0.8 CHEMICAL OXIDATION METHODS IN WATER TREATMENT

Atkinson, John W. (Manchester Corporation Waterworks, Manchester, England), and A. T. Palin (Newcastle and Gateshead Water Company, Newcastle-upon-Tyne, England)
Critical Reviews in Environmental Control 3, No. 2, 153-166 (Feb. 1973)

Natural and polluted waters can contain impurities such as nitrogenous and non-nitrogenous (organic and inorganic) substances and reducing agents such as oxidizable metals that are amenable to chemical oxidation methods of purification. The choice of oxidant is limited because the water is normally destined for human use. The chemicals discussed are chlorine, chloramine, chlorine dioxide, ozone, and potassium permanganate; the factors which govern the choice of chemical are indicated. The author describes the reactions involved and the results that may be achieved in practice by the application of chemical oxidation methods.
[80 references] FTP

0.9 CANALS COOL HOT WATER FOR REUSE

Miller, Stanton S.
Environmental Science & Technology 7, No. 1, 20-21 (Jan. 1973)

Florida Power & Light Company (FPL) has developed a unique concept for power generation and cooling water requirements for its four power plants at Turkey Point, Fla., 25 miles south of Miami. Two conventional oil-fired plants and two nuclear plants are located at Turkey Point. All are in operation, except the second nuclear plant, which is scheduled for initial startup in about 1 year.

The two conventional plants were already operating, and the nuclear plants were under construction when the concern about thermal pollution arose. A resulting Justice Department suit against FPL was settled by a consent decree worked out during numerous meetings between government officials and FPL. The decree is specific about every phase of the cooling requirements. It gives detailed specifications on operation of the cooling system in regards to velocity, volume, and water temperature as well as monitoring requirements. It also specifies terms for the operation of an "interim system." This system, a temporary measure until a "closed system" can be constructed, takes in water from Biscayne Bay to cool the condensers, then (after performing its cooling function) mixes it with more bay water and sends it along a 6-mile canal to cool further. The water is then dumped into Card Sound, located just south of Biscayne Bay. The only restriction is that water cannot leave the canal in excess of 95° F.

The closed system is similar to the system just described, except that it will have 38 canals (for a total length of 168 miles), enough to allow the water to

0.8 (9.19) CUTS RIVER POLLUTION

Anonymous
Food Engineering 45, No. 4, 122 (Apr. 1973)

The Escatawpa River at Moss Point, Miss., was being polluted by bailing water used to transport menhaden from the catch boat to the processing plant. About 350,000 gal. of bailing water were required to lift one million fish into the plant. The water was pumped back to the river untreated. A specialist in water and waste treatment from the Unitech Co., investigated the possibilities of reducing pollutants entering the river. The results of the investigation showed that the bailing water could be treated and re-used. Since the bailing water was moved by a positive displacement pump, a smaller quantity of water was required in comparison to a centrifugal pump; and this quantity of water could be (stepwise) stored, re-used until solids content was increased, and then processed. The stored water containing the solids is pumped through oil and solids separators; the clarified water passes to an evaporator where remaining suspended particles are concentrated to 50% solids. The condensate is returned to the bailing water storage tank for use again. All oil and suspended particles recovered are used to increase the fishmeal yield. The firm has reduced bailing water consumption by 97% which allows the evaporator system to work within capacity, and fishmeal yield has increased. Pollution of the river was reduced.
[1 figure] SW

0.9

cool sufficiently for recycling. Some makeup water will have to be brought in from the bay occasionally, and periodically the system must be purged. The closed system is expected to be completed by late 1974; eight canals have been completed to date.

Other cooling techniques were considered, but were eliminated: cooling towers on marsh land were not feasible, there was no U.S. experience in the use of salt water in utility cooling towers, and deep-well injection was not practical in the marsh area.

FPL has 10 major electric utility plants in Florida and has some under construction. It is taking preventive measures against thermal pollution from all of its plants, but cooling requirements are dictated by environmental requirements of the area where they operate. No uniform solution to every situation has yet been found.
[3 figures] Lee Thorson

0.7 (4.6)(7.67) NUTRITIONAL INTERRELATIONSHIPS AMONG VITAMIN E, SELENIUM, ANTIOXIDANTS AND ETHYL ALCOHOL IN THE RAT

Levander, O. A., V. C. Morris, D. J. Higgs, and R. N. Varma (Nutrition Institute, Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, MD 20705)
Journal of Nutrition 103, No. 4, 536-542 (Apr. 1973)

Giving 20% alcohol as the sole drinking fluid delayed the onset of liver necrosis in rats fed a basal diet deficient in vitamin E and selenium. Addition of ethanol in vitro had no effect on the decline in respiration suffered by liver slices prepared from vitamin E- and Se-deficient rats. Determination of hepatic triglycerides in rats given alcohol for 5 to 6 weeks revealed that animals fed the basal vitamin E- and Se-deficient diet tended to have less fat in their livers than animals fed the same diet supplemented with either 500 ppm vitamin E or 0.3 ppm Se as Na_2SeO_3, or both. Certain fat-soluble antioxidants tended to diminish the hepatolipogenic action of ethanol, whereas vitamin E or Se did not. Examination of the time course of the development of alcoholic fatty liver showed that animals fed either the basal necrogenic diet or the basal diet supplemented with vitamin E and Se underwent a similar pathogenesis of alcoholic fatty liver for about 4 weeks. After this time, however, the vitamin E- and Se-deficient animals lost much of their liver fat, whereas the vitamin E- and Se-supplemented animals did not. The sparing action of alcohol on vitamin E- and Se-deficient animals appears inconsistent with a lipoperoxidative mechanism for chronic ethanol hepatotoxicity. The fact that vitamin E and Se tended to enhance the development of alcoholic fatty liver, whereas certain fat-soluble antioxidants did not, seems inconsistent with an antioxidant role for these two nutrients. Authors' abstract

0.9 WHAT MANAGEMENT EXPECTS FROM R&D TODAY

Charpie, Robert A. (Cabot Corp.)
Research Management 16, No. 2, 7-9 (Mar. 1973)

The priorities for research and development (R&D) are inseparable from the major problems of top management of a company. These priorities consist of finding ways to reverse the trend of losing businesses, keeping the plus business growing, and finding rewarding new areas for new investment. If R&D is to successfully pursue these priorities, it must meet four requirements: (1) realistically appraise the environment in which R&D lives, (2) develop a balance in dealing with each of the foregoing priorities, (3) solve quality problems through hard work, and (4) get results every day. This article is a discussion of each of these requirements. FTP

0.9 MAINTAINING VITALITY AND PRODUCTIVITY IN R&D -- STEPS TO MAINTAIN HIGH LEVEL PERFORMANCE

Decker, W. D., and C. M. Van Atta (Lawrence Livermore Laboratory, University of California)
Research Management 16, No. 2, 20-23 (Mar. 1973)

The authors spent over 1 year visiting various R&D laboratories to learn of their policies and practices in operation and to determine what steps management can take to maintain a vital and creative staff. The five most used actions for acquiring a vital staff are: (1) Hire for new technology and recent training. This is essential for an R&D organization because of the need for continual input of new techniques and fresh ideas. (2) Expect reasonable (and desirable) turnover of professional employees. (3) Management of R&D organization might do most of its hiring through its research groups and then fill the jobs that demand less creativity from within. (4) Term employment may be used. (5) A postdoctral program may be used whereby scientists, particularly, are hired for a 1- or 2-year period to carry out independent research--occasionally exceptional prospects can be uncovered in this manner.

The steps involved in keeping a staff creative and productive are: (1) Critically evaluate employee performance to clearly determine his relative value to the organization. (2) Provide continuing education and training. (3) Rotate assignments of engineers and scientists to broaden their experience, avoid over-specialization, optimize job performance, and provide an infusion of new ideas into established positions. (4) Institute early retirement option that provides adequate

1.82 (1.0117) A STUDY OF THE CLAM, RANGIA CUNEATA, IN LAKE PONTCHARTRAIN AND LAKE MAUREPAS, LOUISIANA

Tarver, Johnnie W., and Ronald J. Dugas
Technical Bulletin No. 5, Louisiana Wild Life and Fisheries Commission, Oyster, Water Bottoms and Seafoods Div., New Orleans, La. (Feb. 1973), 97 pp. Price not given.

The purpose of this study was (1) to determine the clamshell stocks and the rate of replenishment of the shell being harvested, (2) to determine the factors affecting the distribution, density, growth, and reproduction of the clams, and (3) to evaluate the effects of harvesting methods on the environment. The clam shells are used in the manufacture of cement, glass, chemicals, poultry and cattle feed, wallboard and other building products, agricultural lime, road construction, and as fill material in near-shore oil explorations. Also, the shells are used as cultch material in planned live oyster reefs. About 5 million cubic yards of clam shell are dredged annually from Lakes Pontchartrain and Maurepas.

The occurrence, distribution, and density of the clam populations were determined by the use of Peterson grid samples and a modified oyster dredge throughout Lakes Pontchartrain and Maurepas; also, hydrological, sedimentological, and plankton samples were analyzed to determine some of the factors affecting the distribution, density, and growth of the clam R. cuneata. The effects of dredging on the environment are discussed. The data indicate that clam reproduction, recruitment, and growth were occurring in the lakes, but that additional management procedures should be initiated to sustain the yield of clam shell. General recommendations

1.85 (1.0119)(1.012) (1.013) SHRIMP INDUSTRY OF CENTRAL AMERICA, CARIBBEAN SEA, AND NORTHERN SOUTH AMERICA

Gross, George B.
Marine Fisheries Review 35, Nos. 3-4, 36-55 (Mar.-Apr. 1973)

The area reviewed is part of the warm-water fishery of the Western Hemisphere. The shrimp fisheries are based on many species of the large, warm-water genus Penaeus. In some areas, several smaller species known as sea bobs are taken, but the larger penaeid shrimps predominate in the fishery.

Adult shrimps live on muddy sea bottoms in depths, depending on the species, from 1 to 50 fathoms. They spawn at sea, and the young move into coastal lagoons and estuaries where they live in brackish water. At the subadult stage they migrate to nearby ocean waters where they remain for the rest of their lives. Fishing areas are found where open waters cover mud bottoms adjacent to large brackish lagoons. On the Pacific coast the large shrimps can be found in a relatively continuous band from northern Mexico to northern Peru. The gaps exist along stretches of rocky and sandy shores. On the Atlantic side shrimps are found from the southern coast of the United States to Brazil, including the Gulf of Mexico and the Caribbean Sea. There are gaps in otherwise favorable areas around islands and along the mainland coast of the Caribbean Sea.

Commercial fishing for shrimp on the Pacific coast began in the 1950's in Panama and spread northward to Mexico and southward to Peru in the same decade.

1.85 (1.0115) FISHERY FOR NORTHERN SHRIMP, PANDALUS BOREALIS, IN THE GULF OF MAINE

Wigley, Roland L. (National Marine Fisheries Service Northeast Fisheries Center, Woods Hole, Mass.)
Marine Fisheries Review 35, Nos. 3-4, 9-14 (Mar.-Apr. 1973)

The northern shrimp is a medium-sized species that was the basis for a small fishery along the south coast of Maine. This fishery began in 1938 and continued in a modest status until 1962. From 1962 to 1972, the landings and values of landings increased rapidly: 388,000 to 24,295,000 lb. and $57,000 to $4,557,000, respectively. The peak of the landings occurred in 1969--28 million lb.; at the same time fisheries in herring, hake, and haddock were declining. Additional crews and vessels thus became available for shrimping. Since 1969 the total catch has been declining, which may indicate that the maximum harvest of this stock has been attained. The vessels engaged in the fishery include modified lobster boats of 30- to 40-foot length, and small to medium-size trawlers, 50 to 75 feet, formerly engaged in fishing for whiting and other groundfish. A few Gulf of Mexico shrimp trawlers and similar style boats have been used recently in New England waters. The otter trawl, in several styles and sizes, is commonly used depending on the size of vessel, experience of the crew, type of bottom on the fishing ground, and other related factors. Shrimp pots are relatively new to the area, and may be best used on rocky untrawlable bottoms. Some vessels have facilities for boiling whole shrimp in brine. On other vessels, raw whole shrimp are packed in ice, for processing at port facilities. Processors at shrimp ports are equipped to clean, peel,

1.82 (1.0117)

to the industry involved (1) limited entry of new vessels, (2) limit vessel capacity, (3) restrict entry of new companies, (4) restrict fishing area, and (5) assign catch quota to each company.
[32 figures, 35 tables, 48 references] FTP

1.85 (1.0115)

cook, and freeze the shrimp. In the future, larger vessels, especially designed for shrimping will be more numerous, and will be working the fishery farther offshore in the warmer seasons of the year. The author anticipates that small shrimp will make up a larger proportion of the catch if future demand remains unchanged.
[6 figures, 5 tables, 7 references] SW

0.9

pensions for appropriate employees. (5) Salaries and raises should reflect clearly an employee's value to the organization. (6) Improve two-way communication within the organization. (7) Make efforts toward diversification, at least to show staff that management is alert to changing national and social needs. (8) Leave programs and personnel exchanges with other organizations must be administered carefully to ensure that employees are where they will do the most good.
[2 references] FTP

1.85 (1.0119)(1.012)(1.013)

Harvesting of known shrimp stocks on the Pacific coast is near maximum relative to limitations of numbers of vessels, size of boats, access to ports, and size of markets. Guatemala shrimp grounds are an extension of the Mexican grounds in the Gulf of Tehuantepec. The Guatemala grounds merge into those of El Salvador, which has only a Pacific coast. Shrimp production from coastal El Salvador has risen from the beginning in 1955 to a value of $6.155 million by 1971 in exports to the United States alone. The rocky bottom along the Nicaragua coast limits fishing for shrimp. With a Pacific coastline of 190 miles more shrimp landings should be expected than the $6.915 million worth shipped to the United States in 1971. The Pacific grounds of Costa Rica are not productive. The fishery for shrimp in Panama is very productive as is the adjacent Colombian coast. The Ecuadorian shrimp fishery is one of the best developed. Peru, at the southern edge of the range for the warm-water species of shrimp, has a small fishery.

Shrimp exports from the coasts of the Caribbean Sea began much later than from the Pacific coast. Caribbean shrimp occur only in environmentally restricted areas. One of these is in the extreme western Caribbean from the Yucatan Peninsula southward. A second area is off the eastern part of Honduras and the coast and islands of Nicaragua. A third and most productive area is off western Venezuela, in Lake Maracaibo, and the adjacent Gulf of Venezuela.

A short description of the shrimp fishery including landings, value of exports, and boats is given for each nation on the Atlantic and Pacific coasts.
[1 figure, 19 tables] SW

0.9 MAINTAINING VITALITY AND PRODUCTIVITY IN R&D--
STAFF OBSOLESCENCE--ITS COST AND PREVENTION

Branscomb, Lewis M. (IBM Corporation)
Research Management 16, No. 2, 16-19 (Mar. 1973)

Graduate education to a new Ph. D., for example, costs the individual and society $50,000 or more. The technical person, after about 40 years of subsequent employment will cost some one about a million dollars. Allowing such a person to lose his capability and confidence is a personal tragedy and a corporate waste. The responsibility for preventing the loss rests with the employers, the universities, and the individuals.
[2 references] FTP

1.86 (1.0117) A STUDY OF THE BLUE CRAB FISHERY IN LOUISIANA

Adkins, Gerald (Louisiana Wildlife and Fisheries Commission)
Technical Bulletin No. 3, Louisiana Wild Life and Fisheries Commission, Oyster, Water Bottoms, and Seafoods Div., New Orleans, La. (Dec. 1972), 57 pp. Price not given.

During the period of from July 1969 to June 1972, a survey was made of the blue crab fishery of Louisiana. This report is a discussion of the information collected and includes information on the hydrology of the fishing areas, biology of the blue crab, and management recommendations. During the past 10 years, over 9 million pounds of blue crab have been landed annually on the average in Louisiana, with an average annual landed value of about $621,000. Blue crab are harvested commercially with trotlines, trawls, and pots; pots account for the largest catch, but trawls contribute substantially during December and January. Several experimental trawls of basic otter trawl design were tried in various areas, and preliminary results indicate that they may be useful in improving the harvest of blue crab.
[27 figures, 12 tables, 108 references] FTP

1.9 (1.017) REPORT ON A TUNA POLEFISHING AND LIVE BAIT VENTURE, 'HOKO MARU 15': FEBRUARY 8 TO MARCH 24 1972.
SECTION 1: GENERAL INTRODUCTION
SECTION 2: BAIT FISHING

Webb, B. F.
Fisheries Technical Report No. 112, New Zealand Ministry of Agriculture and Fisheries, Wellington, New Zealand (1972), 61 pp. Price not given.

During the early part of 1972, experimental bait fishing was tried in the Marlborough Sounds, New Zealand. The purse seine and the purse seine fishing method are described, as are modifications made of the seine to adapt it to the particular fishing conditions involved. Although catches of bait fish were not great due to the limitations of the gear used, it appears that future commercial possibilities for a live-bait fishery are good.

As a guide for future bait fishermen, the specifications for a New Zealand bait vessel are given.

Section 3 on tuna fishing will be published later.
[18 figures, 24 illustrations, 2 tables, 8 references] FTP

1.89 (0.4) THE CROWN OF THORNS ON CORAL REEFS

Branham, J. M. (Dept. of Biology, University of Utah, Salt Lake City, UT 84112)
BioScience 23, No. 4, 219-225 (Apr. 1973)

Concern over possible destruction of coral reefs has aroused adverse interest in the starfish known as crown of thorns (Acanthaster planci). The presence of this starfish has been referred to as a "plague." The author reviewed the biology of, and historical references to, the starfish and corals to gain perspective on the problem and prepared this report.

The crown of thorns is about the size of a large dinner plate and can exceed one-half of a meter in diameter. Pacific specimens have 16 rays (or arms) usually, extending from a central disc, and covered with sharp spines. Their color in life is variable, green with red-tipped spines, sometimes gray. The spines, up to 5 cm. long, are sharp and can inflict painful wounds. The starfish are found on corals and feed by spreading the gastric sac over their prey to digest away its living tissue. This predation kills the coral polyps and affects the coral colony or reef. The coral reef has the ability to repel the predator with its own stinging capability, depending on the species of coral. Crustacean commensals which live in the colony may also drive the starfish away. A few animals prey on the starfish; one species of fish feeds on eggs as they are released; a coral species feeds on larvae of the starfish; triton shells, a trigger fish, a puffer fish, and the Napoleon fish have been reported to eat adults. These predators are no real threat to the starfish; man can rapidly destroy hundreds of thousands. The author stated that more effort is being spent to kill the starfish than to understand it.

2.110 (1.0116) TO CATCH A MILLION FISH

Tyler, Jim, and Mike McKenzie
Sea Grant Publication UNC-SG-73-05, Division of Commercial and Sport Fisheries, Dept. of Natural and Economic Resources, Chapel Hill, NC 27514 (1969), 17 pp. Price not given.

This booklet contains brief descriptions and illustrations of five kinds of gill nets; five seines; three net and four pot traps; five trawls; three dredges; four lines; and six other types of North Carolina commercial fishing gear. FTP

1.89 (0.4)

The concept of plagues and "population explosions" of the starfish has led to many suggestions as to the cause and to ways of eradicating the organism. The author does not believe that such an increase has occurred through reproduction. They are gregarious and can move fairly rapidly on tube feet. The fears of a population explosion may be the recent discovery of a natural phenomenon that has existed for a long time. The effect of the starfish on reefs is as variable as the reefs. Almost all the coral was killed on parts of the Great Barrier Reef and parts of coral reefs off Guam and Hawaii. But only a small part of the reefs was affected. Sometimes the starfish consume the polyps at the same rate they are growing--without destruction of the reef. Dead parts of reefs have been recolonized from the living parts. Dead reefs on the other hand are not new to the environment. Darwin mentioned a dead reef he found during a stop of the Beagle at Keeling Atoll (96° E. 7° N.) in 1860 [C. Darwin, 1860. The Voyage of the Beagle. The Natural History Library, Anchor Books, Doubleday & Co., New York (1962)]. There is enough doubt regarding the ecology of the crown of thorns and corals to stop uncritical destruction of the starfish.
[3 figures, 67 references]

SW

2.112 (9.6) FAO CATALOGUE OF FISHING GEAR DESIGNS

Anonymous
Published by Fishing News (Books) Ltd., 110 Fleet St., London EC4 2SL, England. (1972), 155 pp. £5.00.
L. Walkear (reviewer)
Australian Fisheries 32, No. 3, 36 (Mar. 1973)

The book contains over 80 net designs and their rigging, with clear and self-explanatory drawings. Many of the gear designs are fished as otter trawls in vessels supplying 200 to 3,000 hp. There are also designs for purse seines, gill and tangle nets, dredges, pots, and long lines. Each design includes the dimensions of the vessels for which it is intended, but there is no text explaining operation of the gear. A wide range of basic information is provided on details of common netting yarns and ropes.

The reviewer commented that the gear designs are not better than those in common use in Australia today.

SW

1.0115 (2.11) RHODE ISLAND'S FLOATING FISH TRAP FISHERY

Holmsen, Andreas A. (College of Resource Development, University of Rhode Island, Narragansett, RI 02282)
Marine Bulletin Series No. 14, Marine Advisory Service, Agricultural Experiment Station, University of Rhode Island, Narragansett, RI 02282 (1973), 10 pp.

This bulletin describes the floating fish trap fishery of Rhode Island and covers the topics of technology and techniques, landings, structure of the fishery, conflicts with other interests, laws affecting the fishery, law enforcement, and recommendations for law enforcement. Trap landings by species and percent of total catch for 1969-71 were: scup, 53%; mackerel, 13%; menhaden, 4%; squid, 4%; bonito, 3%; bluefish, 3%; sea robin, 3%; cod, 2%; and other species, 15%.
[10 figures, 8 tables]

FTP

1.9 (1.0117) A STUDY OF COMMERCIALLY IMPORTANT ESTUARINE-DEPENDENT INDUSTRIAL FISHES

Dunham, Fred (Louisiana Wild Life and Fisheries Commission)
Technical Bulletin No. 4, Louisiana Wild Life and Fisheries Commission, Oyster, Water Bottoms, and Seafoods Div., New Orleans, La. (Dec. 1972), 63 pp. Price not given.

This study involved the area of Barataria Bay and Caminada Bay in Louisiana. The purpose was to obtain information that would aid the fishing industry in the best use of the fish resources. Samples were collected with plankton net and a 16-foot otter trawl, and other samples were obtained at various commercial fish plants.

Bay anchovy was the most abundant species (54.7%) caught in the trawls; the most abundant commercial fish species was the Atlantic croaker. Data on the number of fish eggs and larvae entering the bays did not always correlate with data on the true representation of the abundance of juvenile, subadult, and adult fish populations.

Samplings of commercial fish landings indicated that Atlantic croaker was over 65% of the total catch. Only about 0.05-1.5% of the catch from menhaden vessels were species other than menhaden.
[27 figures, 11 tables, 132 references]

FTP

2.1129 (6.8) A NEW SYSTEM FOR THE COMMERCIAL HARVEST OF PRECIOUS CORAL

Grigg, Richard W. (Institute of Marine Biology, University of Hawaii), Boh Bartko, and Claude Brancart (Makai Range, Inc., Waimanalo, Hawaii)
Sea Grant Advisory Report UNIHI-SEAGRANT-AR-73-01, University of Hawaii, Honolulu, Hawaii (Feb. 1973), 6 pp.

Precious coral is used for jewelry. Dredging, primarily, is used for harvesting precious coral, but this method is destructive and inefficient. The world supply of precious coral is declining so that a means of harvesting it selectively is needed. This paper describes a new system for selectively harvesting precious coral by the use of a submersible.

The system consists of a reinforced wire basket attached to the front of a two-man submersible. The front of the basket contains a movable cutting blade. To harvest the precious coral, the submersible is maneuvered just off the bottom to the base of the coral. The coral is sheared off by the cutting blade and falls into the basket. Coral colonies which do not fall into the basket can be picked up by a manipulator (arm and claw) which is hydraulically operated. The payload of the wire basket is about 75 kg. of coral. A diagram of the precious coral harvesting system is shown in the figure that follows. This new harvesting system permits selective harvest of coral and is more efficient than conventional methods.
[3 figures, 6 references] FTP

2.12 (1.85) AN AUTOMATIC PUMPING DEVICE FOR SAMPLING POSTLARVAL SHRIMP (PENAEUS SPP.)

Marullo, Frank (National Marine Fisheries Service Gulf Coastal Fisheries Center, Galveston Laboratory, Galveston, TX 77550)
Marine Fisheries Review 35, Nos. 3-4, 24-26 (Mar.-Apr. 1973)

In the past, studies were performed to investigate the possibility of predicting the size of total brown shrimp landings from indices of postlarval shrimp abundance. In the studies, samples of postlarval shrimp were collected during their migration into Gulf coastal bays. A 1.5-m. hand drawn beam trawl was used to take the samples. Although the trawl is an effective sampler, trawling is a difficult and time-consuming operation. Other limitations are: (1) sampling is conducted in shallow water away from the passes bearing the main tidal flow, and (2) detritus picked up by the trawl interferes with sorting the samples.

To overcome these problems an automatic sampler was fabricated which collects detritus-free samples at frequent intervals from the main tidal flow. The sampler consists of a diesel engine-driven pump, an electronic control panel, and a turntable equipped with a series of nets for collecting, preserving, and storing the samples. Tests were conducted to compare the automatic sampler with the Renfro beam trawl [U.S. Fish. Wildl. Serv., Circ. 161, p. 86-87 (1963)]. The average maximum catch per hour of the automatic sampler was five postlarvae while the beam trawl catch was larger per tow. The catch of the automatic sampler could be increased by enlarging the intake to the pump. A diagram of the automatic sampler is shown.
[2 figures, 9 references] SW

2.140 TECHNOLOGY RESEARCH ON A SMALL BUDGET

Ben-Yami, M. (Fisheries Technology Unit, Israel)
Fishing News International 12, No. 4, 33-34 (Apr. 1973)

Although Israel's fish industry is small, it is diversified, spread out over three seas and a lake, and technologically, faces problems similar to those of a much larger fishery.

Having limited funds, the Fisheries Technology Unit (FTU) of the Israeli Department of Fisheries takes a "poor man's" approach to research and services. They discovered that the fishery suffers from lack of manpower, wage increases, and price stagnation. Until 1970, the yearly catch fluctuated between 1,000 and 1,500 tons of mostly sardinella (S. aurita) taken by a fleet of 35 catcher boats (9-14 meters long, decked but cabinless seiners) and two or three auxiliary work boats. Fish were usually detected visually and fishing was concentrated in areas close to the harbors. From a series of survey flights, the FTU found that statistically, the distribution of fish and fishing effort did not correlate.

To increase the productivity of the fishery, improved conditions for the fishermen and their catches were suggested. First, cabins were provided for the boats and refrigerated holds were specified for new purse seiners. These boats have also had their deck arrangements modified to change quickly to bottom trawling in the off-season. At the same time, the FTU conducted surveys with echo sounders to chart the grounds and to get a better idea of the seasonal distribution of commercial species. Further, whenever they spotted fish where there were no boats, they broadcasted the information by radio. Later, they would compile a general "fish synopsis" and, if possible, a forecast for distribution to the industry.

2.3 ULTRA-SONIC MEAT TENDERIZING APPARATUS

Guberman, Jerald, and Herman D. Holt; assignors to Advance Patent Technology, Inc., Las Vegas, Nev. (pat.)
U.S. Patent 3,711,896
Official Gazette of the U.S. Patent Office 906, No. 4, 1169 (Jan. 23, 1973)

Ultrasonic energy is used to break down the muscle fibers in meat, thus tenderizing the meat. FTP

2.149 (2.116) NAVIGATION FOR FISHERMEN AND BOAT OPERATORS

Motte, G. A. (Dept. of Fisheries and Marine Technology, University of Rhode Island, Narragansett, RI 02882)
Marine Bulletin No. 10, University of Rhode Island, Kingston, R.I. (1972), 75 pp. Price $3.50. (Available from the Marine Advisory Service, Univ. of Rhode Island, Narragansett, RI 02882)

This book continues where Marine Bulletin No. 7, "Chartwork for Fishermen and Boat Operators" leaves off. Readers of the present book should have a grounding in trigonometry and chartwork or must have satisfactorily completed the exercises in Marine Bulletin No. 7 on parallel, plane, and Mercator sailing. Chartwork involves plotting a ship's course in sight of land; navigation involves plotting a ship's course out of sight of land. Celestial navigation is the primary method of ocean navigation.

This textbook is divided into two parts; part 1 deals with the principles of navigation and part 2 deals with practical problems, including calculations and the use of nautical tables.
[Appendices] FTP

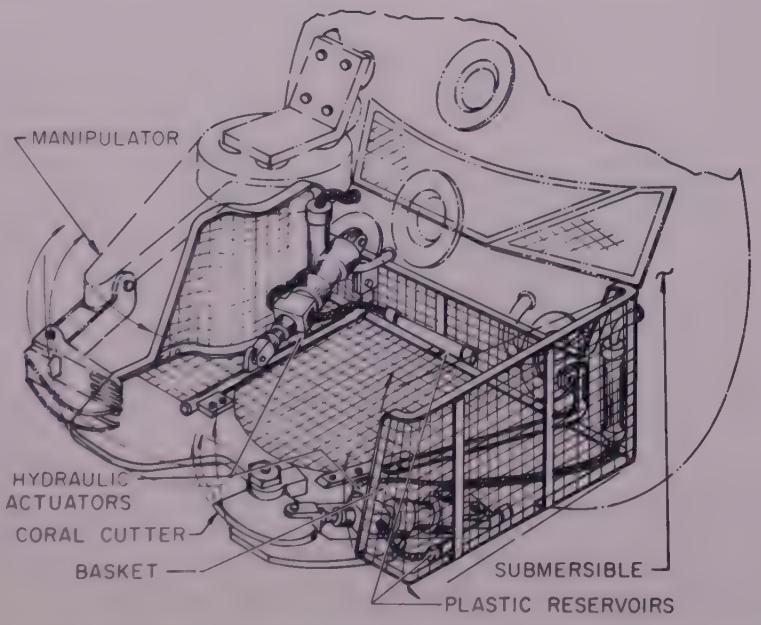
2.43 (3.238)(3.338) (9.6) EDIBLE COATINGS AND SOLUBLE PACKAGING

Daniels, Roger
Published by the Noyes Data Corp., Noyes Bldg., Park Ridge, NJ 07656 (1973), 360 pp. Price not given.

Ordinarily, food packaging (glass, metal, foil, and wax containers) is not part of the food. When the packaging in the form of film or coating is consumed with the food, then the packaging is classified as soluble or edible. External packaging is still necessary to protect foods coated in this manner from contamination; however, the amount of protection required for the food may be much less. This book contains descriptions, methods of preparation, and the patents of many coatings. These include amylose, cellulose, collagen, and protein coatings. Other chapters describe coatings for fruits and vegetables; raisins, dates, and sticky foods; nuts; cereal type products; bakery goods; salt coatings; and vitamins. A highlight of the book is the chapter describing coatings for meat and fish. These include the gelatin containing films and films composed of gelatin-propylene glycol, gelatin metaphosphate, and metal-gelatin (derived from aluminum salts or nontoxic, heavy metal salts such zinc). Other coatings for meat and fish are composed of algin-dextrose, water-in-oil emulsions, mono- and triglycerides, ethylcellulose, starch-gum dispersions, and fatty glycerides.

There are three indexes provided in the book: one is a list of companies owning the patents; the second is a list of the inventors; and the third is a list of all the patents mentioned, United States and British. SW

2.1129 (6.8)



2.140

This forecast is also aided by an infrared radiation thermograph which measures sea surface temperatures.

The FTU designed a very simple version of the hybrid purse seine which combines fast-sinking features and tapered ends with use of vertical rather than horizontal strips of netting. For trawls, they designed a vee door with a combination wood-steel door. These doors do not dig into the mud during shooting whenever a warp slackens excessively.

A member of the FTU measured the bollard pull of Mediterranean trawlers and seiners and found that engine and fishing power correlate only if equally efficient propellers can be fitted. Troubles such as a deteriorated propeller, underpowered engine, oversized gear, badly matched propeller, and other deficiencies were exposed during the bollard pull tests. Measurements from the bollard pull also aided small seiners (converted into dual purpose boats) to match gears.

Six years ago, a member of the FTU designed a slotted-blade propeller (SBP). Test results of the SBP show that (1) it is usable in conditions where a conventional propeller cannot be used; (2) it resists cavitational corrosion; (3) its steady torque enables optimum use of engine power under most conditions; and (4) it increases pull wherever it is installed. Production of the SBP now needs investment and specialized industrial expertise.

On other occasions, the FTU demonstrated electronic underwater and surface lamps to three Israeli purse-seining fisheries for bleak, mackerel, and sardine. In their assistance programs, they lend equipment to fisheries groups. In addition, the FTU recommends to lagoon fishermen that they use a mobile hauling system using one tractor; the suitability of a French gill net hauling machine was also tested. The response of the Israeli fishery to the innovations suggested by the FTU has been increased mobility, and skippers are paying more attention to the information provided. Mary Ellen Engett

3.12 PRESERVATION OF CHANNEL CATFISH WITH SOME SELECTED CHEMICALS

Beuchat, L. R., E. K. Heaton, and T. S. Boggess, Jr. (Dept. of Food Science, University of Georgia Agricultural Experiment Station, Experiment, GA 30212)
Journal of Food Science 38, No. 3, 531-535 (Mar.-Apr. 1973)

Dressed, skinned channel catfish were treated by dipping them in solutions containing various levels of pentasodium diethylenetriaminepentaacetic acid (NEAA), 2,4,4′-trichloro-2′-hydroxydiphenyl ether (CHPE), and methyl 2-chloroacetoacetic acid (MCA) singly and in combination in an attempt to improve the storage life of the product. The samples were stored at 0° C. Organoleptic examinations, surface microbial counts, shear press firmness measurements, pH, and moisture content determinations were made at 0, 3, 6, 8, 10, 13, 16, and 22 days of storage.

The treatments with NEAA and MCA helped preserve the organoleptic qualities of the dressed, skinned catfish, but CHPE did not. However, the population of microorganisms on the surface of the catfish was suppressed by the treatments containing NEAA and CHPE. The texture, pH, and moisture values did not show statistically significant differences as a result of chemical treatment. The authors believe that all three chemicals show promise for extending the shelflife of dressed, skinned channel catfish. [None of the stated chemicals is presently approved by the U.S. Food and Drug Administration as a food additive.]
[1 figure, 5 tables, 12 references] FTP

3.14 (6.132) PROCESS FOR KILLING SALMONELLA IN FISH MEAL

McConville, Thomas P. (Long Beach,Calif.); assignor to Westgate-California Foods, Inc., San Diego, Calif. (pat.)
U.S. Patent 3,723,136
Official Gazette of the U.S. Patent Office 908, No. 4, 1080 (Mar. 27, 1973)

In this process, fish meal is exposed to dichloromonofloromethane gas or Freon 21 gas to kill Salmonella. FTP

3.14 (6.24) PRESERVATION OF SHARK LIVER WITH SODIUM BISULFITE

Volkova, N. S., J. Franco-Betancourt, U. Vasquez, I. Pedroso, and M. Reboso (U.S.S.R.)
Chemical Abstracts 78, No. 8, 47698j (Feb. 26, 1973)

3.15 (0.5) EFFECTS OF IRRADIATION ON THE SURVIVAL OF VIRUS IN WEST COAST OYSTERS

Di Girolamo, Rudolph, J. Liston, and J. Matches (Dept. of Biology, College of Notre Dame, Belmont, CA 94002, and Institute for Food Science and Technology, College of Fisheries, University of Washington, Seattle, WA 98105)
Applied Microbiology 24, No. 6, 1005-1006 (Dec. 1972)

The purpose of this study was to examine the ability of ionizing radiation to inactivate viruses in shellfish. Use of ionizing radiation has been proposed as a possible means of eliminating food pathogenic microorganisms from shellfish. Test oysters in aquaria were contaminated with poliovirus (strain Lsc-2ab). The whole oysters or the shucked oysters were exposed to 50, 100, 150, 200, 300, or 400 krads of radiation. The percent survival of the virus for the whole oysters varied from 87% at 50 krad of radiation to 13% at 400 krad and for the shucked oysters was 68% at 50 krad of radiation to 7.3% at 400 krad. There was significant survival of virus at all levels of radiation tested.
[2 tables, 7 references] FTP

3.239 (3.2382) EVAPORATION LOSSES FROM FROZEN MEAT IN RETAIL CABINETS

Cutting, C. L., and R. Malton (Meat Research Institute, Agricultural Research Council, Langford, Bristol, England)
Refrigeration and Air Conditioning 76, No. 900, 41-43 (Mar. 1973)

Many commercial operators of frozen food storage establishments erroneously believe that lower storage temperatures cause more loss due to drying than higher storage temperatures. Practical investigations and theoretical deductions contradict this belief and instead have confirmed the opposite; namely, with lower temperatures there is less loss due to drying. Drying is affected not only by temperature, but by air speed over the meat, the temperature difference between the air and the surface of the cooling coils, the fluctuations in air temperature, and, in retail display, heating induced by radiation from cabinet and shop lighting. In certain circumstances an increase in dehydration due to these other factors could outweigh a reduction of dehydration caused by lowering the temperature.

Experiments were performed to investigate the evaporation losses in frozen meat. Beef joints and steaks were wrapped in either 70- or 100-gauge PVC film or sealed in polyethylene bags. Sliced steaks and pork chops were packed in foam polystyrene trays overwrapped with either film. Half of the packs were punctured to reproduce damage that occurs in displays. The wrapped samples were stored in cabinets maintained at -30°, -12°, or -8° C. The results showed that meat stored in the lowest temperature cabinet lost weight least rapidly. Film wrapping eliminated overall weight loss but evaporation within the package was seen as ice

3.4 FISH PRODUCT

Unilever NV (pat.)
Netherlands Patent Application 7,111,727 (1972) (In Dutch)
Food Science and Technology Abstracts 4, No. 12, 12R669, 171 (Dec. 1972)

Portions of smoked fish adhering to one another are produced by treating raw, filleted fish with NaCl (or an edible phosphate) until the salt content is 0.5-12.0% of the wet weight of the product. The material is then formed and frozen, and exposed to wood smoke. The temperature of the fish during smoking should not be above -8° C. The method is suitable for cod, halibut, haddock, herring, and other members of the Clupeidae and Gadidae. Bloodstained or discolored fish should be removed before processing to maintain top quality. SW

3.239 (3.2382)

crystals deposited on the meat and inside of wrapper. Steak lost more weight than joints. Meat exposed to shop illumination showed higher temperatures and higher weight losses than packs in shaded areas in the cabinets. Drying was slower in unpunctured tightly fitting wraps. The authors concluded that the rate of surface desiccation and loss of appearance of frozen meat on display is minimized by maintaining an unfluctuating temperature as low as possible.
[3 figures, 5 tables] SW

3.12 PRESERVATIVE FOR USE IN FOOD INDUSTRY

Kovac, Jaroslav, and Jan Farkas (pat.)
Czech. (Patent) 144,649 (July 15, 1972)
Chemical Abstracts 77, No. 25, 163248r (Dec. 18, 1972)

3.15 THE EFFECT OF GAMMA RADIATION ON PRERIGOR MORTIS FILLETED COD

Jebsen, Jens W. (Chemico-Technical Research Institute of the Directorate of Fisheries), Gulbrand Lunde (Central Institute for Industrial Research), and Bjarne Underdal (Dept. of Food Hygiene, Veterinary College of Norway)
Fiskeridirektoratets Skrifter Serie Teknologiske Undersøkelser (Reports of Technological Research concerning Norwegian Fish Industry) 5, No. 11, Directorate of Fisheries, Bergen, Norway (1972), 14 pp.

Fresh cod fillets were packed in plastic bags and irradiated at 25, 50, 90, and 180 krad. Irradiated and control samples (not irradiated) of fillets were stored at 0° C. and examined at periodic intervals for proteolytic activity, total bacterial count, trimethylamine (TMA), total volatile base (TVB), volatile acids (VA), hypoxanthine, and glutamate-oxalacetate-transaminase (GOT).

The proteolytic activity in the irradiated cod fillets was considerably lower than that in the control (nonirradiated) fillets. Bacterial count was decreased by irradiation; the count correlated with the proteolytic activity. TMA, TVB, and VA values and hypoxanthine formation were retarded by irradiation. The GOT level was lower in the irradiated than in the nonirradiated fillets. The irradiated cod fillets were organoleptically acceptable after 27 days of storage at 0° C.; the nonirradiated fillets were acceptable for 14 days.
[9 tables, 27 references] FTP

3.4 SMOKE FLAVORING

Ross, S. W. (pat.)
U.S. Patent 3,709,700
Food Technology 27, No. 5, 188 (May 1973)

This barbecue additive imparts a smoke flavor to meats and other foodstuffs. FTP

3.239 (3.2382) USE OF PACKAGING MATERIALS DURING THE FREEZING OF FISH IN FAST-FREEZING APPARATUS

Voskoboi, A. V., and G. S. Konokotin (U.S.S.R.)
Chemical Abstracts 77, No. 25, 163146f (Dec. 18, 1972)

3.12 PRESERVATIVE FOR USE IN FOOD INDUSTRY

Food, In or out of containers, is sterilized by a continuous process utilizing electromagnetic energy. FTP

3.15 APPARATUS FOR CONTINUOUS ELECTROMAGNETIC STERILIZATION

Lipoma, Samuel P. (825 - 19th Place, Delano, Calif.) (pat.)
U.S. Patent 3,718,082
Official Gazette of the U.S. Patent Office 907, No. 4, 918 (Feb. 27, 1973)

4.86 CHROMATOGRAPHIC TECHNIQUES IN TANNERY CONTROL.
1. RAPID ESTIMATION AND QUANTITATIVE DETERMINATION
OF MINERAL OILS IN PRODUCTS LUBRICATED BY TANNING

Cot, J., A. Marsal, and M. Marquilles (Dep. Curtidos, Patronato 'Juan de la Cierva, Barcelona, Spain)
Chemical Abstracts 78, No. 6, 31437n (Feb. 12, 1973)

4.89 SPERMACETI-BASED EMULSIFIERS FOR OINTMENTS

Greve, Rainer (pat.)
German Offen. 2,117,661 (Oct. 19, 1972)
Chemical Abstracts 78, No. 2, 7835v (Jan. 15, 1973)

4.86 INFLUENCE OF FAT LIQUORING AND OTHER FACTORS
ON SEMIFINISHED LEATHER PROPERTIES. I.

Lacour, Norman, A., Alberto Angelinetti (Cent. Invest. Tecnol. Cuero, La Plata, Argentina)
Chemical Abstracts 78, No. 6, 31433h (Feb. 12, 1973)

6.132 (6.19) EFFECTS OF HEAT TREATMENT ON COMPOSITION AND NUTRITIVE VALUE OF HERRING MEAL

Myklestad, Ole, Johan Bjørnstad (Norwegian Herring Oil and Meal Industry Research Institute, Bergen, Norway), and Leif R. Njaa (Government Vitamin Laboratory, Bergen)
Fiskeridirektoratets Skrifter Serie Teknologiske Undersøkelser (Reports on Technological Research concerning Norwegian Fish Industry) 5, No. 10, Fiskeridirektøren, Bergen, Norway (1972), 15 pp.

The purpose of this study was to determine the effect of heating herring press cake on the quality of the final herring meal, with emphasis on heating conditions comparable to those used commercially to prepare fish meal. These conditions, roughly, are reduction of fish press cake from about 50% moisture content to less than 10% moisture content at a maximum meal temperature of about 100° C. during a period ranging from 10 to 60 min.

In these experiments, simulation of commercial conditions was done with the use of a special stainless-steel rotary autoclave (volume of about 50 liters) equipped for heating and cooling. The test meals were prepared from herring that had been stored for 4 days on ice. The fish were processed in a continuous steam cooker at jacket pressure of 2 kg./cm.^{2}, and the emulsion of oil and stickwater was removed from the cooked material in a screw press. The press cake was ground, vacuum packaged in 1-kg. portions in plastic bags, and the packaged press cake was stored under nitrogen at -30° C. until required for the tests. In each experiment a batch of press cake was freeze dried to the appropriate moisture content to serve as the reference sample of meal. The test treatments of the press cake in

4.86 LEATHER IMPREGNATION. I. FAT LIQUORING WITH SULFATE AND SULFITE OILS

Sofia, Alberto, Victor D. Vera, and Jorge Vergara (Cent. Invest. Tecnol. Cuero, La Plata, Argentina)
Chemical Abstracts 78, No. 6, 31431f (Feb. 12, 1973)

6.132 (6.19)

the autoclave involved heating the material to temperatures of from 96° to 132° C. and exposure of from 0-2 hr. All the test meals produced contained 82.5% to 85.0% protein (dry basis).

Short periods of heat treatment at about 125° C. appeared to stabilize the lipid phase against oxidation during storage of the meal. After 4 weeks such meals had a carbonyl number of 74-91 nmol CO/kg. fat, whereas the unheated reference meal had a carbonyl number of 323. The iodine number of the heated meals was about 120 g. I_2/100 g. fat (on the average) and of the unheated meal was 100 g. I_2/100 g. fat. The heat treatments caused a slight decrease in the amino-acid content of the meals. There was no correlation between the available lysine and the conditions of heat treatment, but there appeared to be a tendency for lysine availability values to decrease during prolonged heating of the herring material with increased moisture content.

During the heating treatments, the pepsin digestibility for the wet meals (about 40% moisture) dropped to about 33% with reference to the freeze-dried sample and for the dry meals (about 9% moisture) to about 66%. Pepsin digestibility values correlated well with values for nutritive criteria obtained in animal feeding tests.

[2 figures, 7 tables, 27 references] FTP

4.86 FATTY SUBSTANCES IN HIDE AND LEATHER. 10. INFLUENCES OF FATLIQUORING ON THE RECOVERY AND MECHANICAL PROPERTIES OF CHROME COLLAGEN FIBER FROM CHROME SPLIT LEATHER

Shirai, Kunio, and Hiroshi Okamura (Yamazaki Chem. Lab., Souk, Japan)
Chemical Abstracts 78, No. 6, 13435k (Feb. 12, 1973)

4.86 FATLIQUORING PROPERTIES OF ANION-ACTIVE LIQUORING OILS

Hollstein, M. (Zschimmerund Schwarz, Chem. Fabr., Lahnstein, Germany)
Chemical Abstracts 78, No. 4, 17656b (Jan. 29, 1973)

6.132 FISH PROTEIN CONCENTRATE

Sharp, K. H. (pat.)
U.S. Patent 3,707,381
Food Technology 27, No. 4, 119 (Apr. 1973)

Ground fish are soaked in a weak aqueous formaldehyde solution and then dried. The product does not have the offensive odor of many fish meals. FTP

4.86 FACTORS INFLUENCING SOFT LEATHER DRESSING

Hollstein, M. [Hollstein ?] (Firma Zschimmer und Schwarz, Oberlahnstein, Germany)
Chemical Abstracts 78, No. 4, 17660y (Jan. 29, 1973)

6.10 BARIUM-CONTAINING RUST-PREVENTING PAINTS

Kuehn, Martin (pat.)
German Offen. (Patent) 2,105,680 (Aug. 24, 1972)
Chemical Abstracts 77, No. 26, 166275h (Dec. 25, 1972)

6.19 EFFECT OF VITAMIN D, DIETARY ENERGY ON LAYERS DISCUSSED

Anonymous
Feedstuffs 45, No. 19, 82, 84 (May 7, 1973)

During the 1973 Maryland Nutrition Conference held in Washington, D.C., M. L. Scott of Cornell University reported results of experiments to determine the effect of vitamin D on layer eggshell quality. Vitamin D was removed from the diet of laying hens. After the hens were depleted of vitamin D, they were fed the following diets, and the rate of return to normal egg production and eggshell quality was determined. The ration fed consisted of corn, soybean meal, 2.5% fish meal, 7.5% meat and bone scrap, 0.25% dried fish solubles, 1.25% dried whey, and 1.25% stabilized grease together with alfalfa meal, minerals, vitamins, and added methionine. The diet, without added vitamin D, was fed to 120 hens; the same diet with added vitamin D was fed to another group of 120 hens. All hens were at peak egg production at the beginning of the experiment. For 2½ months, egg production and shell quality were the same in both groups of hens. After this time, the diet was changed to an all-plant diet without fish meal and solubles, meat scrap, whey, and animal grease. Plant protein was substituted for animal protein. The vitamin D supplement was continued for the appropriate group. Egg production and shell quality remained unchanged for the next 40 days, and then egg production dropped precipitously in the group of hens on the vitamin D-free diet. At the same time, but lagging behind the drop in production, the breaking strength of the eggs declined from 3.5 kg. (average) to 2.7 kg. The major part of the drop occurred within the last 3-day period of the experiment. Of the hens considered to be free of vitamin

6.55 WOOD WASTE MATERIALS AS FEEDSTUFFS FOR RUMINANTS

Dinius, D. A. (Nutrition Institute, Ruminant Nutrition Laboratory, Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, Md.)
Feedstuffs 45, No. 14, 22 (Apr. 2, 1973)

This is a short review of some research studies reported in the literature on the use of sawdust, woodpulp, newsprint, office paper, and paperboard as feedstuffs for ruminants. Some pertinent data are shown in the following tables:

Feeding steers finishing rations containing sawdust

Item	Treatment		
	15% fine sawdust	15% coarse sawdust	15% ground timothy hay
Number of steers	6	6	6
Daily gain (lb.)	2.86	3.23	3.65
Feed/gain	7.23	6.95	6.36
Concentrate/gain	6.15	5.91	5.41
Dressing (%)	61.32	59.51	60.17

6.233 PREPARATION AND COMPOSITION OF THE LIVER EXTRACT FROM FISH LIVER RESIDUE--A BYPRODUCT OF FISH LIVER OIL INDUSTRY

Haq, S. A., Saleha Masood, and Razia Rafiq (Pakistan Council of Scientific and Industrial Research Laboratories, Karachi 39, Pakistan)
Science and Industry 9, Nos. 1-2, 67-71 (Jan.-Apr. 1972)

Papain digestion was more effective than pepsin-trypsin digestion or pressure cooking (15 lb. for 30 min.) for producing an extract from fish liver residue (material left after the extraction of oil). The enzyme digestions gave higher levels of B-complex vitamins in the final liver extract than did the pressure cooking method. The fish liver residue used was obtained from a fish liver oil factory; it represented the residue left over after the commercial extraction of oil.
[1 table, 12 references] FTP

7.0 FOOD

Yeransian, James A., Katherine G. Sloman, and Arthur K. Foltz (General Foods Technical Center, White Plains, NY 10602)
Analytical Chemistry, Annual Review of Analytical Applications 45, No. 5, 77-112 (Apr. 1973)

This review of the field of food analysis covers the advances, innovations, and improvements which have appeared since the last survey was published in 1971 [Anal. Chem. 43, 70R (1971)]. The major subdivisions of food analyses included in the review are quantitative and qualitative procedures for: Additives; Adulteration, Contamination, and Decomposition; Carbohydrates; Color; Enzymes; Fats, Oils, and Fatty Acids; Flavors and Volatile Compounds; and Identity (covering information on the composition of genuine foods, such as butter as a stated ingredient in a food relative to fraudulent substitution).

In addition, the following subjects are reviewed: Inorganic (food constituents such as metal salts); Moisture; Organic Acids, such as malic, citric and oxalic acids in food products; Nitrogen, such as in protein, ammonia, and amino acids; and Vitamins. A Miscellaneous section is devoted to organizations on development of analytical methods, problems and progress in analytical methods for food toxicology including pesticides, and methods for classifying honey, and other procedures. A large bibliography is provided for each subject. SW

6.54 ECONOMICS, MARKETING, AND TECHNOLOGY OF FISH PROTEIN
(9.6)

Tannenbaum, Steven, and Bruce Stillings (editors)
Published by the MIT Press, Massachusetts Institute of Technology, Cambridge, MA 02142 (June 1973). Price $13.95 (estimated). [Number of pages not given.]
Food Technology 27, No. 5, 169 (May 1973)

This book contains a review of the present state of fish protein concentrates and assesses their future potential as a significant source of dietary protein. It contains review papers by experts on the extent of the fisheries resources, processing methods, nutritional evaluations, application in foods, economic aspects, and marketing. FTP

6.69 PROTEIN RECOVERY FROM THE FLUID DISCHARGED IN THE LEACHING OF KAMABOKO. I.

Kojima, Yoshio, Kinjiro Yamada, Yasumasa Oba, Masayuki Kochi, and Shoji Tagawa (Japan)
Chemical Abstracts 77, No. 10, 65999s (Sept. 4, 1972)

6.84 PREPARING A MOTHER-OF-PEARL PASTE FROM FISH SCALES

Kanevskii, M. U., I. A. Malyavina, M. S. Voskoboinikova, E. S. Tolchinskaya, L. D. Rozengauz, N. M. Dvorkina, M. V. Kalantarova, E. V. Nechaeva, T. I. Makarova, and R. G. Kamaletdinova (Moscow Plant of Theatrical Cosmetics) (pat.)
U.S.S.R. Patent 325,015 (Jan. 7, 1972)
Chemical Abstracts 76, No. 22, 131393x (May 29, 1972)

6.19

D, those showing reduced egg production were chosen for a study of vitamin D restoration. The average breaking strength of eggs from these birds was 1.7 kg. One group was fed the original diet with no vitamin D, and other groups were fed the diet with graded levels of vitamin D. All the groups returned to normal production in 2 weeks. The studies indicated that fish meal and solubles, meat scraps, whey, and animal grease contributed enough vitamin D to maintain normal egg production and egg quality. Hatchability of eggs from vitamin D-deficient hens was markedly lower than that of eggs from hens on a normal diet. SW

6.191 FISH CYTOLYSIS

Gattino, Jean, Albert Hurm, and Georges Lamotte (pat.)
French Patent 2,097,636 (Apr. 7, 1972)
Chemical Abstracts 78, No. 1, 3007d (Jan. 8, 1973)

6.55

Wood pulp as energy source for fattening steers

Item	Percent of woodpulp		
	0	50	70
Number of steers	6	9	9
Intake/day (lb.)	19.21	20.68	17.29
Gain/day (lb.)	3.85	3.17	2.99
Feed/gain	5.30	7.15	5.76

Newsprint as feedstuff for growing cattle

Item	Percent of newsprint			
	0	8	16	24
Number of steers	12	12	12	12
Avg. daily gain (lb.)	1.91	1.80	1.19	0.55
Avg. daily feed intake (lb.)	18.24	16.90	13.31	9.86
Feed/gain	9.48	9.39	11.20	17.63

[4 tables, 13 references] FTP

7.599
(9.19)

TECHNIQUES FOR ANALYSIS OF PARAFFIN HYDROCARBONS AND FOR INTERPRETATION OF DATA TO ASSESS OIL SPILL EFFECTS IN AQUATIC ORGANISMS

Clark, Robert C., Jr., and John S. Finley (National Marine Fisheries Service, Northwest Fisheries Center, Environmental Conservation Division, Seattle, WA 98102)
Proceedings of Joint Conference on Prevention and Control of Oil Spills, 13-15 March 1973, American Petroleum Institute, Environmental Protection Agency, and U.S. Coast Guard, (1973), pp.161-172. Available from the American Petroleum Institute, 1801 K St., N.W., Washington, DC 20006. Price not given.

Normal paraffin hydrocarbons are one of the major groups of compounds in crude oil and petroleum products. Since these compounds can be readily separated from aquatic organisms using solvent extraction and liquid-solid chromatography and identified by gas-liquid chromatography, the normal paraffins can serve as indicators of petroleum pollution in the aquatic environment. It is necessary, however, to differentiate between natural (or biogenic) hydrocarbons and those assimilated by the organisms from pollution sources by comparing the natural hydrocarbon content and pattern ($\underline{n}$-C_{14} to $\underline{n}$-C_{37}) of organisms from areas of pollution with those of organisms from relatively "unpolluted" areas.

The paper suggests techniques for obtaining and analyzing petroleum hydrocarbon data which can lead to a standard method for detecting and following the biological uptake of oil by living organisms from the aquatic environment.
[4 figures, 4 tables, 15 references]

Abstractors: Robert C. Clark, Jr. and John S. Finley

9.

MAP PROJECTIONS FOR GEODESISTS, CARTOGRAPHERS AND GEOGRAPHERS

Richardus, Peter, and Ron K. Adler
American Elsevier Publishing Co., Inc., New York, N.Y, (1972), 174 pp. Price not given.

This book provides information on purposes and methods of projections, classification of map projections, datums and coordinate systems, and a summary of representation problems. In addition, general transformation formulae, theory of distortions, azimuthal and equidistant projections, and equivalent projections are described. The appendices cover a summary of mapping equations and constants used in mapmaking SW

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8.51

AMINO ACID COMPOSITION OF THE FISH PROTEIN CONCENTRATE FROM CASPIAN SPRAT

Cheremin, Yu. A. (Astrakh. Med. Inst., Astrakhan, U.S.S.R.)
Chemical Abstracts 78, No. 1, 2896f (Jan. 8, 1973)

8.51 AMINO ACID COMPOSITION OF PEPTIDE CONCENTRATES
Sedykh, L. N., and O. V. Yurina (U.S.S.R.)
Chemical Abstracts 77, No. 11, 73817w (Sept. 11, 1972)

MARINE FISHERIES ABSTRACTS VOL. 26 NO. 7 PAGE 23

9.11
(9.1)

MAN-MADE CHANGES IN THE EASTERN MEDITERRANEAN SEA AND THEIR EFFECT ON THE FISHERY RESOURCES

Ben-Tuvia, A. (Israel Oceanographic and Limnological Research Ltd., Haifa Laboratories, Haifa, Israel)
Marine Biology 19, No. 3, 197-203 (Apr. 1973)

The eastern area of the Mediterranean Sea was strongly influenced by two important changes: the completion of the Suez Canal in 1896, and completion of the Aswan High Dam on the Nile River in the year 1964. The Suez Canal, as an interconnecting waterway between the Red Sea and the Mediterranean, caused extensive changes in the fauna of the eastern area of the latter. Thirty species of Red Sea fishes can be found along the adjoining coasts of Israel and Lebanon: 21 are common, and 16 species are found regularly in commercial catches. Twenty-one percent of the Israel trawl catch and 8% of the inshore fishery is estimated to consist of Red Sea species.

The completion of the Aswan High Dam stopped the seasonal flooding of the Nile which had a strong effect on the marine environment in the delta region. When the flooding stopped the sardinella fishery along the Egyptian coast collapsed. Activity in this fishery occurred between August and December; the same period that the Nile floods discharged large volumes of mud and water, rich in nutrients, into the delta area. About 10,000 fishermen participated to produce a yearly catch that fluctuated between 10,000 and 20,000 tons. By 1966, the catch dwindled to 554 tons. The small sardinella fishery of Israel remained unchanged after the cessation of the Nile floods. The season for this fishery began in April and lasted to October. The average annual catch was about 1,350 tons.

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8.59 (1.53) POLYCYCLIC AROMATIC HYDROCARBONS IN HAKE LIVER AND TISSUE

Morgante, Anna (Ist. Merceol., Univ. Pescara, Pescara, Italy)
Chemical Abstracts 78, No. 3, 14602v (Jan. 22, 1973)

9.11 (9.1)

The cessation of the Nile floods also eliminated a fresh-water barrier between the North African coast and the entrance to the Suez Canal. An increasing westward dispersion of Red Sea species, emerging from the canal, to the North African coast was expected. Reports of occurrence of the species off Libya and Tunis in 1971 confirmed the prediction.
[1 table, 42 references] SW

7.612 FLUOROMETRIC DETERMINATION OF VITAMIN A IN FOODS

Erdman, John W., Jr., Shu-Hui F. Hour, and Paul A. Lachance (Dept. of Food Science, Rutgers University, New Brunswick, NJ 08903)
Journal of Food Science 38, No. 3, 447-449 (Mar.-Apr. 1973)

The colorimetric Carr-Price reaction, the official AOAC method for vitamin A analysis, may be insensitive and nonspecific, because some nonvitamin A compounds interfere with the colorimetric procedure. This paper describes a modification of the fluorometric method of J. N. Thompson, P. Erdody, R. Brien, and T. K. Murray [Biochem. Med. 5, 67 (1971)] for use in determining vitamin A in foods. The food samples are ground, saponified, homogenized, and then extracted with hexane for direct fluorometric measurement of vitamin A. The method has been applied to the assay of vitamin A in cereals, margarines, instant breakfast powders, pastry, cakes, and certain entrees (freeze-dried beef casserole).
[4 figures, 1 table, 17 references] FTP

9.1 HAWAIIAN REEF ANIMALS

Hobson, Edmund S., and E. H. Chave
University Press of Hawaii, Honolulu, Hawaii (1972), 135 pp. Price not given.

Eighty-six richly colored photographs of inhabitants of the reefs are presented in two broad categories: the fishes and the invertebrates. Representative fishes include the shark, moray eel, squirrel fishes, parrotfishes,, scorpionfishes, gobies, blennies, and others. The other category describes jellyfishes, corals, mollusks, crabs, sea urchins, and others. A short section on collecting describes how to clean out shells for display. Short comments on life history and habits of the animals are given. SW

9.1 (1.92) STRUCTURE OF THE PERCH POPULATIONS OF SOME PONDS IN FINLAND

Sumari, Olli
Annales Zoologici Fennici 8, 406-421 (1971) Helsinki, Finland

Rotenone was used to poison the fish in 32 small, oligotrophic [low in plant nutrients and rich in oxygen] ponds in Finland. The ponds were from about 1 acre to 130 acres in area. The numbers of perch and the biomass were determined. The perch estimated to be one, two, and three summers old were found to be 5.6, 9.5, and 12.4 cm. long., respectively. In one pond, all the perch were six summers old and of the same size. During the first few summers the growth rate of perch is the same as in larger waters, but later the growth rate decreases and may nearly cease. The author surmises that the growth rates correlate with food availability. The growth rate of older perch is high when young perch are available; it appears that the young are part of the food supply of the older fish.

The average biomass of perch was 11.9 kg. per hectare. The biomass of perch was smaller in ponds containing roach than in ponds without roach. The author concluded that the main factors affecting the perch populations are biotic, such as predation on young perch by perch, roach, pike, and burbot, and the availability of food.

[7 figures, 8 tables, 35 references] SW

9.12 (1.92) THE EGG DENSITY AND THE SURVIVAL OF EGGS ON THE SPAWNING GROUNDS OF THE VENDACE (COREGONUS ALBULA L.) IN LAKES PURUVESI AND OULUJÄRVI

Nissinen, Toivo
Tiedonantoja 1, No. 1, 1-114 (1972) Riista- Ja Kalatalouden Tutkimuslaitos Kalantutkimusosasto. Address: Librarian, Finnish Game and Fisheries Research Institute, Fisheries Div., Pitkänsillanranta 1A, 00530 Helsinki 53, Finland. (In Finnish, English summary)

Studies were conducted to determine the egg density and survival of the vendace in Lakes Puruvesi and Oulujärvi, Finland. At Lake Puruvesi, the age group 0+ was caught every other winter, and the age group 1+ was caught the following season in smaller numbers. Vendace of three growing-seasons old or older were taken in summer and during the spawning season. The vendace spawns for the first time at the age of 1+. The egg density at the spawning grounds varies from year to year from 9.5 to 21.2 eggs per square meter in good years. In poor years, when the spawning population is small, the egg density range is between 0.7 and 3.9 eggs per square meter.

At Lake Oulujärvi, the egg density in spring was between 5 to 6 eggs per square meter. The density in the autumn was 20 to 30 eggs per square meter in the best years, and 7 eggs per square meter in poor years. The author suggests that fluctuations of vendace population could be predicted by estimating egg density and survival. The survival rate for eggs in Lake Puruvesi in autumn and spring is about 35%; in Lake Oulujärvi it ranges between 20 and 30%.

9.14 (1.92) IMPACT OF FISH FEED MANAGEMENT AND PROCESSING ON PROFIT

Hastings, W. H. (Fish Farming Experimental Sta., Bureau of Sports Fisheries and Wildlife, Stuttgart, Ark.), and Bill A. Simco
Feedstuffs 45, No. 18, 33-34, 72 (Apr. 30, 1973)

The ideal feed is easily located by fish (in spite of heavy stocking density), has high acceptance, availability and conversion by fish, and is water stable. Processing feed to improve the physical quality can promote achieving these ideal characteristics. The standard conditions for making hard pellets are fine grinding, heavy steam conditioning before compression, and adequate drying after extrusion. One more step in the process can make a better pellet: conveying the pellets through a hot air dryer, similar to that used to make floating pellets, causes gelatinization of starch on the surface, a "case hardening," which results in improved water stability. The high temperatures associated with pellet making are destructive to several essential vitamins. Vitamin A, thiamine, and ascorbic acid are sensitive to oxidation during food processing. These vitamins are either protected by added antioxidants or, if lost, replaced by fortification of the formulae. Vitamin A is protected by encapsulation in microcrystalline wax compounds. An advantage of the process required for expanded pellets is that it reduces levels of residual pesticides.

Feeding experiments were conducted using various protein levels and different sources of protein. Feeds containing 30% protein were found to be most economical as indicated by cost analyses under the management conditions used. The Fish

9.15 REPORT OF THE SYMPOSIUM ON THE MAJOR COMMUNICABLE FISH DISEASES IN EUROPE AND THEIR CONTROL

Dill, William A. (editor)
EIFAC Technical Paper No. 17, European Inland Fisheries Advisory Commission, Food and Agriculture Organization, Via delle Terme di Caracalla, 00100, Rome, Italy (1972), 40 pp.

The Symposium was held April 20-22, 1972, in Amsterdam, Netherlands. The Symposium consisted of nine panels: eight panels discussed major fish diseases, and the ninth panel discussed control measures.

The volume and value of imports and exports in Europe of live fish and fish eggs are large. An example of one country's trade in these products is the Federal Republic of Germany (West Germany). In 1970, German imports of live fish were over 8,000 tons valued at $16 million. The fish are imported for (1) food, (2) brood stock for fish farms and hatcheries, (3) stocking natural waters and reservoirs, and (4) for use as bait fish and ornamental species. The following fish and fish eggs were listed in the trade: eels, Atlantic salmon, brown and sea trout, rainbow trout, huchen (Hucho hucho), chars (Salvelinus), white fishes (Coregonus), grayling (Thymallus thymallus), pike (Esox lucius), common carp, bream, crucian carp (Carassius carassius), goldfish (C. auratus), roach, tench, grass carp (Ctenopharyngodon idella), channel catfish, perch, and pike perch (Stizostedion lucioperca).

9.12 (1.92)

The vendace spawns on sloping beds composed of soft mud. The oxygen levels in the water and mud of the spawning grounds are maintained by slow currents in the lakes. The temperature of the water near the mud bottom of the Puruvesi spawning ground was found to be 2° C., while that of Oulujärvi was 1° C. and less. The author suggests that fishing for vendace in the 0+ age group should be regulated to ensure a sufficient spawning population to maintain the fishery.
[14 figures, 28 tables, 51 references] SW

9.15

The major diseases are distributed as follows. Viral hemorrhagic septicemia is confined to rainbow trout in Europe. Infectious pancreatic necrosis affects salmonids in the United States, France, Sweden, Italy, Scotland, and Japan. Infectious hematopoietic necrosis is a disease of young salmonids. Infectious dropsy of cyprinids occurs in all European countries with intensive carp culture. Swim bladder inflammation of cyprinids affects all age groups of wild and domestic carps in eastern Europe. Furunculosis affects all salmonids in salt and fresh-water and other fresh-water fish except in Australia and New Zealand. Ulcerative dermal necrosis affects salmonids and trout. Whirling disease occurs in Europe, Korea, North America, South Africa, and Colombia. It affects salmonid fishes. Descriptions were given of causative agents, symptoms, and transmission controls for all diseases.

The ninth panel agreed on the following points: (1) There is need for international control; (2) The most effective control method was inspection at the source; (3) Initially, international control should concentrate on traffic in the cultivable species and should include crayfish; (4) The major communicable fish diseases should be subject to international control measures; (5) The diseases require adequate methods for diagnosis; and (6) The international control system should be supported at the national level by inspections of hatcheries, reporting of epidemics, and certification of stocks, eggs, and establishments.

A list of participants and observers in the panels is given. SW

9.15 INVERTEBRATE PATHOLOGY NONCOMMUNICABLE DISEASES
(1.8)

Sparks, Albert K. (National Marine Fisheries Service Gulf Coastal Fisheries Center, Galveston, TX 77550)
Academic Press, New York, N.Y. (1972), 387 pp. Price not given.

The subjects covered include the following: changes in cells following death; reaction to and repair of injuries; physical injury caused by changes in pressure or temperature; and chemical injuries caused by poisons, pesticides and detergents. Other subjects include injuries caused by venom or biotoxins and ionizing radiation. Tumors and tumorlike conditions are described in the last chaper. A bibliography is provided for each chapter, and there is an author and subject index. SW

9.14 (1.92)

Farming Experimental Station (FFES) standard test formula feed contains fish meal as a source of protein. Another source is poultry byproduct meal and delactosed whey. Growth has been as good as with previous FFES standard feeds. Results of supplementing feeds with lysine were erratic.

In experiments on population density and polyculture using catfish and hybrid buffalo fish the following data emerged. Unfed buffalo fish stocked in ponds at 135 per acre at harvest averaged 1,395 g. each. In feed provided ponds where catfish were stocked at 2,000 per acre and buffalo fish were stocked at 200 per acre, the latter were harvested weighing 1,110 g. each. Buffalo fish alone stocked at 1,000 per acre were harvested weighing 772 g. each. Low-density stocking is more productive per fish than high density stocking.
[3 figures, 9 tables] SW

9.14 RELATION BETWEEN THE TYPE OF NATURAL NUTRIENTS AND CHITINOLYTIC ACTIVITY IN THE DIGESTIVE TRACT OF SOME MARINE TELEOSTS

Colin, D. A. (Lab. Marit. Physiol., Inst. Michel Pacha, Tamaris-sur-Mer, France)
Chemical Abstracts 78, No. 1, 2134f (Jan. 8, 1973)

9.15 CHITINOCLASTIC BACTERIA ASSOCIATED WITH SHELL DISEASE IN PENAEUS SHRIMP AND THE BLUE CRAB (CALLINECTES SAPIDUS)

Cook, David W., and Sandra R. Lofton (Gulf Coast Research Lab., Ocean Springs, MS 39564)
Journal of Wild Life Diseases 9, No. 2, 154-159 (Apr. 1973)

The presence of the infectious agent that causes shell disease or burned spot or rust disease in the lobster, blue crab, and king crab--commercially important species--is cause for concern in the fisheries. Chitinoclastic bacteria have been isolated from the lesions. These bacteria are ubiquitous in the marine environment and are part of the normal flora on marine crustaceans. The shell degradation in crabs was limited to the exocuticle and the calcified endocuticle. The bacteria do not penetrate into the soft tissue under the shell. The infected specimens overcame the disease by molting. The incidence of the disease is low in natural populations.

The incidence of the disease was investigated in several species of Penaeus shrimp collected from rearing ponds in Mississippi, Texas, Louisiana, and Florida; blue crabs and clams were also examined. When diseased portions on the shells were found, they were removed and streaked onto agar plates. Chitinoclastic bacteria were isolated from the shells and identified as Beneckea type I and Pseudomonas. Vibrio types I, II, and III and Beneckea were found on diseased clam shell. Beneckea type I is suspected of being the causative agent because it was found on diseased shells of all species examined.

[3 figures, 2 tables, 10 references] SW

9.16 (1.85) PROGRESS TOWARD FARMING SHRIMP IN THE UNITED STATES

Neal, Richard A. (National Marine Fisheries Service Gulf Coastal Fisheries Center, Galveston, TX 77550)
Marine Fisheries Review 35, Nos. 3-4, 67-70 (Mar.-Apr. 1973)

The strong demand and high prices paid for shrimp are incentives for development of farm raised shrimp. Several developmental farms are in operation seeking methods of economical shrimp aquaculture. In parts of southeast Asia and in Japan shrimp are farmed profitably. In the United States a rapidly accumulating store of knowledge on shrimp farming has emerged. Contributions have been made by researchers in State and Federal laboratories and in the universities. The emphasis in the studies has been on rearing shrimp at high densities which requires examining many factors. This approach makes the costs of rearing shrimp difficult to obtain. Pilot-scale operations by industry have developed cost data, but this information is considered propietary and not available. Using information that is available, shrimp can be raised to a length of 4 in. in a static pond, with no supplemental feed, at the rate of 100-150 lb. per acre. By fertilizing the pond, the yield can be increased another 100 lb. Continuous exchange of water will increase yield again, but the penalty of a polluting effluent will appear. The market value of 4-in. shrimp is low and growth of shrimp to lengths over 5 in. is slow. The slower growth to larger size increases the costs of the crop and reduces the return expected from larger shrimp. Mortality rates of shrimp in crowded conditions and for extended periods are a constant threat to profits. Survival in pond-rearing

9.17 SEACOAST PLANTS OF THE CAROLINAS FOR CONSERVATION AND BEAUTIFICATION

Graetz, Karl E. (Soil Conservation Service, U.S. Dept. of Agriculture)
Sea Grant Publication UNC-SG-73-06, University of North Carolina, Sea Grant Program, Chapel Hill, NC 27514 (Feb. 1973), 206 pp. Price not given.

Near the ocean, plant selection, use, and culture is drastically different from that in the interior. Coastal beach environment is hostile to plant life, and plants that have adapted themselves to seaside conditions through the years find establishment difficult. This bulletin contains the following sections: 1. The Beach Environment (Salt spray, The sand, Temperature, The wind); 2. Stilling the Sand with Grasses and Forbs (a herb that is not a grass); 3. Woody Plantings for Dune Protection; 4. Beach Landscaping; 5. Evaluation of Perennial Beach Plants; and 6. Plant Descriptions.

[Illustrated, 16 references] FTP

9.17 (9.16) ARE HATCHERIES AND SPAWNING CHANNELS ALTERNATIVES TO STREAM PROTECTION?

Narver, David W. (Fisheries Research Board of Canada, Pacific Biological Station, Nanaimo, British Columbia, Canada)
Circular No. 93, Fisheries Research Board of Canada, Pacific Biological Station, Nanaimo, B.C., Canada (Mar. 1973), 11 pp. Price not given.

This paper was presented at the Truck Loggers Association Convention held in Vancouver, British Columbia, on Jan. 9-12, 1973. The author's objective was to show why hatcheries and spawning channels are not alternatives to stream protection measures. The author first discusses the concept of and the costs of stream protection and four aspects of the fishery resource base concerned. He concludes that hatcheries and spawning channels can play an important role in maintaining stocks of salmon and trout in the face of environmental change (such as dams), extremely intensive fisheries, and in those few situations where nature can be improved. But, the total fishery values associated with forested streams are large and are increasing, and these values can be degraded by logging. The direct and indirect costs to society are probably much less if stream protection measures are employed than if the stream is not protected and hatcheries and spawning channels are constructed to replace lost salmon and trout production. The author states that there are no alternatives to strict and rational stream protection measures.

[1 figure, 6 references] FTP

9.16 (1.85)

experiments from postlarval to 4-in. size has been 50% with a range of zero to nearly 100%. These mortalities are intolerable from an economic point of view.

Research is being directed toward problems in the following areas: (1) finding a dependable method for bringing female shrimp to maturity in captivity; (2) developing economical, nutritious feed; (3) developing the diagnosis, prevention, and treatment of shrimp diseases; and (4) developing a method for intensive culture of shrimp in closed systems. Profitable shrimp aquaculture in the United States is probably several years away; however, steady progress is being made toward that goal.

[1 figure, 5 photographs] SW

9.16 (0.8) SEA WATER SYSTEM FOR AQUACULTURE OF ESTUARINE ORGANISMS AT THE SKIDAWAY INSTITUTE OF OCEANOGRAPHY

White, David B., Robert R. Stickney, David Miller, and Lee H. Knight (Skidaway Institute of Oceanography, Skidaway Island, GA 31406)
Technical Report Series No. 73-1 Georgia Marine Science Center, University System of Georgia, P.O. Box 13687, Skidaway Island, GA 31406 (Jan. 1973), 18 pp. (Unpublished manuscript) Price not given.

This paper describes in detail the water system for aquaculture of estuarine organisms at the Skidaway Institute of Oceanography, and it includes a cost-accounting note. The report has been prepared in order to aid interested persons in the development of similar systems in areas with similar water quality problems. The sea-water system is capable of delivering over 100 gallons (380 liters) of clear sea water per minute. The system has several unique features for use in local estuarine waters.

The quality of the water must be controlled in any laboratory in which marine animals are cultured. The sea-water source for the Skidaway Institute contains considerable organic matter and clay particles. The system described is designed to handle such sea water.

[4 figures, 5 references, 1 appendix] FTP

9.19 (7.80) FLAVOR EVALUATION BY TRIANGLE AND HEDONIC SCALE TESTS OF FISH EXPOSED TO PULP MILL EFFLUENTS

Farmer, F. A., H. R. Neilson, and D. Esar (School of Food Science, McGill University, Montreal, Quebec, Canada)
Canadian Institute of Food Science and Technology Journal 6, No. 1, 12-16 (Jan.1973)

Flavor panel studies were used to detect flavor changes in fish resulting from exposure of the fish to various pulpmill effluents and to effluents treated to remove odor and taste. By means of triangle taste tests for flavor, the evaporator condensate, digester effluent, and recovery furnace flue gas condensate from the kraft mill were identified as the sources causing flavor tainting in fish exposed to them. Removal of the flue gas condensate to 1% of total mill effluent improved the flavor of the fish as judged by the hedonic scale test. Removal of the evaporator condensate down to 1% of total mill effluent caused no improvement in fish flavor. Fish exposed to effluent treated with activated sludge and turbulent contact absorber plus a stay in an aerated lagoon were less objectionable than fish exposed to untreated effluents. The effective effluent treatments in increasing order of value were turbulent contact absorber, activated sludge, and a stay in an aerated lagoon.

[3 tables, 9 references] SW

9.19 (9.6) INTRODUCTION TO MARINE ENVIRONMENTS

Zottoli, Robert (Dept. of Biology, Fitchburg State College, Fitchburg, Mass.)
C. V. Mosby Co. (publisher), St. Louis, Mo. (1973), 125 pp., 95 illustrations. Price not given.

This textbook is designed for advanced high school students and college students. The introduction deals with the ecology, reproduction, growth, and survival of marine life. The section on "Abiotic and Biotic Factors" covers chemical and physical factors, food habits, and productivity of the sea. The section on "Habitats and Inhabiting Organisms," covers the forms of life found in tidal pools, beaches, estuaries, bottoms, and rocky intertidal zones.

Each chapter contains a list of references cited, and there is a 10-page list of selected references subdivided by chapter. A subject index is included. Most of the chapters have field exercises which are adaptable to fresh-water environments.

SW

9.19 (7.9) TRENDS IN METHODOLOGY FOR EVALUATION OF EFFECTS OF POLLUTANTS ON MARINE ORGANISMS AND ECOSYSTEMS

Waldichuk, Michael (Fisheries Research Board of Canada, Pacific Environment Institute, West Vancouver, British Columbia, Canada)
Critical Reviews in Environmental Control 3, No. 2, 167-211 (Feb. 1973)

This review covers developments in the techniques and general methodology used in studies of the marine environment, of aquatic organisms, and of the marine ecosystem as related to pollution and other manmade changes. The author emphasizes the total system approach in ecology involving the disciplines of marine biology at all trophic levels, the various aspects of physical and chemical oceanography, and mathematical modeling. Laboratory studies of tolerance of organisms to pollutants now consider responses to sublethal doses. Adverse physiological and behavioral responses of organisms to pollutants exist at levels as much as three orders of magnitude lower than the lethal threshold.
[2 figures, 3 tables, 378 references] FTP

9.19 (1.92) GEOTHERMAL MERCURY POLLUTION IN NEW ZEALAND

Weissberg, B. G., and M. G. R. Zobel
Bulletin of Environmental Contamination and Toxicology 9, No. 3, 148-155 (Mar. 1973)

Many mercury ore deposits are directly associated with active hot springs or have mineral structures and textures that indicate they were deposited from currently inactive hot spring systems. A close relationship between mercury ore concentrations and hot springs is widely accepted; however, most hot spring waters contain very low concentrations of mercury--0.01 to 2 µg. per kilogram of water. Inorganic mercury discharged from these sources may accumulate in the sediments of rivers or lakes. After microbial methylation of inorganic mercury and transport into the water, methylmercury may become concentrated in the edible tissue of fish.

Experiments were performed to find the relation of mercury in the sediments to that in fish. Rainbow and brown trout, and sediments from the Waikato River and lakes (North Island, New Zealand) were analyzed for total mercury using a method of flameless atomic absorption. Gas chromatography tests specific for methylmercury performed on about one-half of the trout samples indicated that all the mercury present was in this form. Sediment samples were obtained from cores from water depths up to 33 m.

The results indicate that trout living in waters receiving geothermal discharges had much higher concentrations of mercury than fish in waters receiving little or no thermal discharges. Mercury concentrations in fish in waters receiving mercury-containing industrial effluents were higher than in fish in waters receiving geothermal discharges. Mercury concentrations in sediment and sedimentary

9.19 (7.42) MERCURY: SHORT TERM STORAGE OF NATURAL WATERS

Carr, Roderick A., and Peter E. Wilkniss (U.S. Naval Research Laboratory, Washington, DC 20390)
Environmental Science & Technology 7, No. 1, 62-63 (Jan. 1973)

Samples of mercury-containing natural waters may require short-term storage before being analyzed. Other workers have found that under storage conditions mercury may be transferred from the water to the container walls, particulates, and to vapor. To minimize losses in storage, other workers used oxidants and acids, which were also used to prepare the samples for quantitative analysis. The authors developed a sensitive method for determining mercury content using carrier-free labeled Hg^{197} and an improved flameless atomic absorption technique.

The authors based their method on the simultaneous radio tracer, cold vapor reduction-aeration measurements with the tracer added carrier-free, leaving the system at essentially the natural concentration (1-100 ng./l.). In their study, they took samples from Chesapeake Bay with a typical estuarine water salinity of 5‰ and 7 mg./l. suspended solids. Carrier-free Hg^{197} was added to two 1-liter and two 19-liter samples and stored for 8 days in polyethylene containers. One of each pair was acidified to a pH of 1 with redistilled nitric acid. Initially, the mercury in the acidified sample was in a solid state, but it gradually became soluble. Purging of an aliquot at 96 hr., using conditions previously developed for flameless atomic absorption, showed quantitative removal of the tracer. After 8 days, whole bottle counting indicated 0.7% of the tracer had adhered to the container.

9.19 CHLORINATED HYDROCARBON PESTICIDES AND RELATED COMPOUNDS IN ADIPOSE TISSUE FROM PEOPLE OF JAPAN

Curley, A., V. W. Burse, R. W. Jennings, and E. C. Villanueva (U.S. Environmental Protection Agency, Chamblee Toxicology Laboratory, 4770 Buford Highway, Chamblee, GA 30341), L. Tomatis, and K. Akazaki
Nature 242, No. 5396, 338-340 (Mar. 30, 1973)

Persistent, chlorinated hydrocarbon pesticides are regularly found in ecosystems and in adipose tissue of people. Polychlorinated biphenyls (PCBs) are persistent compounds used in manufacturing processes. PCBs are also found in the environment and are reported to be in human tissue. To determine the presence of these compounds in people of Japan, 241 adipose tissue samples from Japanese autopsies were analyzed. Twenty-five random samples of tissue were analyzed for PCBs after separation of DDT-like compounds. Techniques of chromatography were used in the analyses.

Preliminary results of the tests show that DDT, dieldrin, and heptachlor epoxide levels were within the range found in human adipose tissue in the United States. Levels of isomers of hexachlorocyclohexanes were high compared to levels found in the United States. All 25 samples analyzed for PCBs were positive; a concentration of less than 1.00 p.p.m. in 80% of the samples was found.
[4 figures, 2 tables, 13 references] SW

9.19

The nonacidified sample remained in a solid state throughout storage. Acidification and immediate purging at 8 and 96 hr. removed only 10% of the tracer. Whole bottle counting at 8 days indicated 15.3% of the tracer was associated with the container--a serious loss.

A meaningful analysis for total mercury cannot be obtained by flameless atomic absorption techniques if the major part of the element is in the solid state. Storage of the samples for 8 days at pH < 1 allows total mercury to be properly determined.

Although it is expected that mercury would associate with the large surface area available in the turbid bay water, surprisingly almost quantitative association of mercury with particulates is found in clean glacial meltwater. A frozen sample obtained from a depth of 57 meters at Camp Century, Greenland, showed that the mercury is almost quantitatively associated with filterable solids, but is released into solution during storage at a pH < 1.

[2 figures, 8 references] Mary Ellen Engett

9.19 LEAD IN SOILS AND PLANTS: A LITERATURE REVIEW

Zimdahl, Robert L., and Jon H. Arvik (Dept. of Botany and Plant Pathology, Colorado State University, Fort Collins, CO 80521)
Critical Reviews in Environmental Control 3, No. 2, 213-224 (Feb. 1973)

Lead (Pb) occurs in the environment naturally; its distribution is altered by the activities of man. Native lead occurs in insoluble forms as sulfides, oxides, and carbonates. The earth's crust contains on the average about 16 p.p.m. of lead. This review covers the literature relative to the behavior of lead in soils and plants.

The addition of lead to the soil from atmospheric fallout increases the average level only imperceptibly. The movement of lead in the soil is limited due to the sorptive ability of the soil. Plants take up lead slowly through their roots, and plant foliage may absorb lead. The lead taken up by the roots from the soil generally remains in the roots. The lead from the atmospheric contamination of plants usually remains as a topical coating of particles on the foilage. The present levels of lead associated with crops are not sufficient to pose a hazard to humans or animals.

[129 references] FTP

9.19 EFFECTS OF ELEMENTAL PHOSPHORUS ON MARINE LIFE

Jangaard, P. M. (compiler and editor)
Circular No. 2, Atlantic Regional Office, Research & Development, Fisheries Research Board of Canada, Halifax, Nova Scotia, Canada (Nov. 1972), 313 pp. Price not given.

During the winter and spring of 1969 large numbers of dead and dying fish were found in Placentia Bay, Newfoundland, coinciding with the opening of a local phosphorus plant. The reports presented in this volume describe the results of the investigations that followed leading the way for the eventual coexistence of a major industry and a fishery. The 28 reports represent original manuscripts or reprints of articles published in various scientific journals. The contents are divided into six sections as follows: (1) The Phosphorus Pollution Crisis. Chronology and Summary (5 reports), (2) Behavior of Elemental Phosphorus as a Pollutant (6 reports), (3) Toxicity of Elemental Phosphorus to Marine Life. Bioassays (6 reports), (4) Histology and Hematology (3 reports), (5) Chemical Studies. Analytical Methods (5 reports), and (6) Analytical Results (3 reports). FTP

9.19 (1.92)

rocks ranged from about 0.1 to 0.5 mg. per kg. of sediment. Concentrations of mercury in trout ranged up to 0.2 mg. per kg. of tissue. The authors wish to emphasize the narrow margin between background concentrations of mercury in the environment and the higher mercury level in sediments that are affected by geothermal discharges. This environmental pollution may cause the mercury concentrations in trout to exceed 0.5 mg. per kg. of fish, the maximum concentration acceptable for human consumption.

[2 figures, 2 tables, 14 references] SW

9.19 THE ENVIRONMENTAL FATE OF STRANDED CRUDE OIL

Blumer, M. (Woods Hole Oceanographic Institution, Woods Hole, MA 02543), M. Ehrhardt, and J. H. Jones
Deep-Sea Research 20, No. 3, 239-259 (Mar. 1973)

The magnitude of oil production and transportation by tanker since World War II has been associated with increasing oil pollution of the shores, coastal waters, and open ocean. Qualitative information on the immediate and long-term ecological effects of spilled oil is lacking. The persistence of oil pollutants determines the amount of accumulation, and consequently, the total impact on marine organisms.

Over a period of time, the petroleum or petroleum products in the marine environment undergo 'weathering,' which is an alteration of the material by several processes: evaporation, dissolution, microbial degradation, and chemical degradation. The relative importance of these processes is controlled by environmental conditions such as temperature. However, chemical degradation of petroleum becomes evident only at an advanced stage of weathering, the final products resembling asphalt. The products resulting after completion of each of these processes can be subjected to gas chromatography for identification.

The fate of two spills of crude oil which stranded on the coasts of Martha's Vinyard, Mass., in 1970 and Bermuda, 1970, was studied during 13½ months and 16 months, respectively. The findings show that the lower boiling point components were evaporated within a few months of the spill. Compounds containing 23 carbons or more were not affected by evaporation. Microbial degradation was active in the presence of decaying seaweed and other nutrients available on the rocks. In the

9.19 MECHANISMS OF TRACE METAL TRANSPORT IN RIVERS

Gibbs, Ronald J. (Dept. of Geological Sciences, Northwestern University, Evanston, IL 60201)
Science 180, No. 4081, 71-73 (Apr. 6, 1973)

Understanding the fate of trace metals that pollution superimposes on the environment requires knowledge of their mechanisms of transport in rivers and their chemical cycles in nature. Trace metals may be found in the following states in the rivers: (1) dissolved or adsorbed on solids readily available for reaction with other substances; (2) in organic compounds or metallic hydroxides--chemical changes are required to make them available; and (3) in the crystal structures of suspended materials--nearly unavailable in nature.

Experiments were performed to determine the amounts of iron, nickel, copper, chromium, cobalt, and manganese transported by rivers. Samples of water and suspended sediments were obtained from the Amazon and Yukon Rivers well upstream of the ocean and away from sources of pollution. The samples were treated by extraction, reduction, dialysis, oxidation, or fluxed as required to free the metal ions from complexes.

The results of the investigation indicate that the distribution of trace metals in both rivers was similar. In addition, copper and chromium were combined in crystalline solids. Manganese was found in coatings on particles, and iron, nickel, and cobalt were distributed equally between precipitated metallic coatings on particles and crystalline solids.

[1 figure, 1 table, 13 references] SW

9.19 INTERAGENCY INVESTIGATIONS OF A PERSISTENT OIL SPILL ON THE WASHINGTON COAST. ANIMAL POPULATION STUDIES, HYDROCARBON UPTAKE BY MARINE ORGANISMS, AND ALGAE RESPONSE FOLLOWING THE GROUNDING OF THE TROOPSHIP GENERAL M. C. MEIGS

Clark, Robert C., Jr., and John S. Finley (National Marine Fisheries Service, Seattle, WA 98112), Benjamin G. Patten (National Marine Fisheries Service, Mukilteo, Wash.), Dennis F. Stefani (Environmental Protection Agency, Region X, Seattle, Wash.), and Edward E. DeNike (Washington State Dept. of Ecology, Olympia, Wash.)
Proceedings of Joint Conference on Prevention and Control of Oil Spills, 13-15 March 1973, American Petroleum Institute, Environmental Protection Agency, and U.S. Coast Guard (1973), pp. 793-808. Price not given.

An interagency team of biologists, chemists, oceanographers and engineers has been investigating the long-term effects of oil spilled by the grounding of the troopship General M. C. Meigs January 6, 1972, on an ocean coast intertidal community of plants and animals. Oil has continuously been released from the 440,000 liters of Navy Special Fuel Oil carried by the vessel. The team assessed biological damage by making (1) surveys of abundance and physiological condition of animals, (2) qualitative evaluation of obvious damage to plants, and (3) measurements of the hydrocarbon uptake in both plants and animals. A series of sites, forming a vertical profile of the rocky shelf area from the upper intertidal zone to the lowest low tide level in Wreck Cove, has been studied.

9.19 USE OF "WHOLE EGG RESIDUES" IN PESTICIDE/EGGSHELL STUDIES

Lakhani, K. H. (Natural Environment Research Council, The Nature Conservancy, 19-20 Belgrave Square, London SW1, England)
Nature 242, No. 5396, 340-341 (Mar. 30, 1973)

In a previous contribution, W. Hazeltine [Nature 239, 410 (1972)] argued against a proposal by L. J. Blus, C. D. Gish, A. A. Belisle, and R. M. Prouty [Nature 235, 376 (1972)]. These investigators suggested that a concentration-effect relation existed between DDE in eggs and shell thickness. The author states that Blus and his associates refuted Hazeltine's argument. The author advances another argument against Hazeltine's view that whole egg residues are valueless in pesticide-eggshell thickness studies of incubated eggs because the residues are metabolized during incubation. The author points out that Hazeltine gave no data for residues based on whole egg basis and gave no acceptable evidence to show metabolism of DDE. In addition, use of whole egg residues for these studies would provide a conservative test if the correlation between eggshell thickness and levels of residue is asserted to be negative. The author suggests that the work of Blus and associates has satisfied this condition.

[3 references] SW

9.19

This report describes the preliminary findings of the first ten months (January-October, 1972) of the investigation. Abnormal and dead urchins (Strongylocentrotus purpuratus) indicated that this species was affected. Loss of fronds and bleached thalli not evident in control areas were observed in the plant community in the immediate vicinity of the hulk. Petroleum hydrocarbons were taken up in the intertidal community. The normal paraffin hydrocarbon patterns and content over the range n-$C_{14}H_{30}$ to n-$C_{37}H_{76}$ of healthy-appearing goose barnacles (Mitella polymerus), crabs (Hemigrapsus nudus) and an alga (Fucus gardneri) display the same basic characteristics as the fuel oil which had been lost from the General M. C. Meigs.
[12 figures, 5 tables, 18 references]
Abstractors: Robert C. Clark, Jr., John S. Finley, Benjamin G. Patten, Dennis F. Stefani, and Edward E. DeNike

9.19 DDE IN EGGS AND EMBRYOS OF BROWN PELICANS

Nisbet, I. C. T. (Massachusetts Audubon Society, Lincoln, MA 01773)
Nature 242, No. 5396, 341-342 (Mar. 30, 1973)

In a previous report, W. Hazeltine [Nature 239, 410 (1972)] argued against the association of eggshell thinning with p,p'-DDE, which has been reported by several other workers. His argument asserts that the developing embryo metabolizes DDE residues. The author argues that Hazeltine's data did not demonstrate the metabolism of DDE; furthermore, since thinner shelled eggs containing higher levels of DDT are broken more frequently, the eggs in Hazeltine's samples had larger than average shell thickness. Hazeltine also mistakenly correlated positively shell thickness with DDE concentration in the lipids of the yolk. The author argues that this correlation is inappropriate because during incubation lipids are reduced by metabolism thus DDE levels appear to increase. The author stated that Hazeltine's statistics relating shell thickness to whole egg residue of DDE are not significant. Finally, the author states that the thinning of birds' egg shells caused by ingested p,p'-DDE is one of the best known of environmental phenomena. He therefore finds it odd that Hazeltine, with evidence based on a sample too small and homogeneous, should question the validity of the phenomenon.
[22 references] SW

9.19

absence of nutrients, no microbial degradation occurred in a 16-month period. The process of dissolution was slow, especially on higher boiling-point compounds. After 16 months at Bermuda and 13½ months at Martha's Vinyard, there was little chemical degradation of the crude oil.

The authors concluded that the spilled oil is very persistent; and weathering may be more rapid on the beaches than in the open ocean. Paraffin-rich wax inclusions were found in the oil stranded on Bermuda. These precipitate from paraffinic crude oils during shipment in tankers. The authors suggest that the presence of these 'tar balls' in the open ocean may provide direct evidence that they originated from tank cleaning operations and provide an indicator of the need for control measures.
[5 figures, 6 tables, 11 references] SW

9.19 OCEANIC OBSERVATION OF NEW YORK BIGHT BY ERTS-1
(7.9)

Charnell, Robert L., and George A. Maul (National Oceanic and Atmospheric Administration, Atlantic Oceanograhic and Meteorological Laboratories, Physical Oceanography Laboratory, Miami, Fla.)
Nature 242, No. 5398, 451-452 (Apr. 13, 1973)

During August 1972, the multispectral scanner (MSS) aboard the first Earth Resources Technology Satellite obtained images of New York Bight that indicated variations of water quality. The results demonstrate the effectiveness of the use of satellite in observing surface features of oceanic significance. The MSS measures reflectance of solar energy in four channels having band pass filters that cover the visible and near infrared bands from 0.5 to 1.1 μm. The solar energy penetrates ocean water deeper for the shorter observed wavelengths; thus, features characteristic of the water mass (turbidity, for example) are more predominant in the lower bands. The article contains one illustration of the bulk process imagery of the New York Bight showing the oceanic features indicative of the disposal of various wastes. The authors suggest that satellites with sensors optimized to view the ocean in visible and infrared wavelengths, supplying synoptic data over large areas, will materially aid management of the coastal zone on a broad scale.
[2 figures, 1 reference] FTP

9.19 ORGANIC MERCURY COMPOUNDS IN COASTAL WATERS

Fitzgerald, W. F., and W. B. Lyons (Marine Sciences Institute and Dept. of Geology, University of Connecticut, Groton, CT 06340)
Nature 242, No. 5398, 452-453 (Apr. 13, 1973)

The role of mercury and its eventual fate in the fresh-water and marine environment will depend upon the chemical and physical form that mercury exists in the environment. This article gives data on the total and inorganic content in the coastal waters and adjacent river waters of Long Island Sound. The analyses were carried out on two sets of samples of the natural waters. The first set was analyzed directly giving the amount of inorganic mercury in the water. The second set was analyzed after it had been allowed to photo-oxidize to destroy the dissolved organic carbon present. Analysis of this second photo-oxidized set of samples gave the total amount of mercury present. The amount of mercury associated with organic matter was considered the total mercury value minus the inorganic mercury value. The mercury was analyzed by a modification of the standard flameless atomic absorption technique.

The levels of inorganic, organically associated, and total mercury in Long Island Sound waters are shown in the table that follows. Earlier published work has shown that the amount of mercury in sea water ranged from 0.003 to 0.364 µg. $liter^{-1}$. The present data are within this broad range of mercury levels, but, in addition, seem to indicate that much of the mercury exists in the organically

(over)

9.2 ORGANIZING AND OPERATING A FISHERY COOPERATIVE. PART 1 AND PART 2

Smith, Frederick J. (Marine Economics, Oregon State University)
Sea Grant No. 19, Part 1, 4 pp. and No. 19a, Part 2, 43 pp. Oregon State University, Extension Marine Advisory Program, Corvallis, OR 97331. Prices not given.

A fishery cooperative consists of a group of fishermen acting together for mutual benefit. It is created to help resolve an economic need such as to stabilize income from season to season, to improve quality control, to reduce cost of fishing supplies and equipment, or to establish a competitive market for fish products. The cooperative may perform one or more functions; for example, transport fish products to processors or markets, operate fishing vessel service stations, operate vessel repair shops, market members' fishery products, arrange for financing, or operate seafood processing plants.

To organize and operate a fishery cooperative successfully, knowledge and understanding of cooperative management and marketing is required. These publications give information on organization, management, and legal aspects of fishery cooperative organization and operation. Part 1 provides an overview of cooperative organization and operation. Part 2 provides information on cooperative by-laws and agreements and on State and Federal regulations. The sections of part 2 are: Considerations in Preparing By-Laws; An Outline for Preparing By-Laws; Sample By-Laws; Sample Marketing Agreements; and Federal Fishery Cooperative Regulations.

FTP

9.19 METHYLMERCURY: BACTERIAL DEGRADATION IN LAKE SEDIMENTS

Spangler, William J., James L. Spigarelli, Joseph M. Rose, and Hope M. Miller (Midwest Research Institute, Kansas City, MO 64110)
Science 180, No. 4082, 192-193 (Apr. 13, 1973)

The presence of methylmercury in lake sediments has been attributed to bacterial methylation of inorganic mercury (Hg^{2+}). The authors state that, although this process is generally accepted, most workers have been unable to find even trace amounts of methylmercury in a variety of naturally occurring sediments or water. An investigation was undertaken to determine the cause of inability to find methylmercury in sediments.

Sediments were taken from the delta area of the St. Clair River, Mich. The sediments were mixed with water in a ratio of 150 g. (wet weight) to 100 ml. water; the mixture was prepared in a flask and 2 mg. of labeled mercuric chloride was added. The flask was incubated for 146 days without shaking, and it was flushed with a continuous stream of sterile air. A trap containing a solution of KBr and $HgBr_2$ was attached to the flask to collect any volatile mercury species in the effluent air. During the first 50 days of incubation, concentrations of methylmercury increased from zero to 0.31 µg./g. The electron-capture gas chromatography method was used in the determinations. As the incubation continued there was a rapid decrease in the amount of methylmercury and a simultaneously rapid increase in mercury vapor (Hg°) collected in the trap. Furthermore, no methylmercury was found in the trap at this time. To determine if microbial degradation caused the loss of methylmercury, an inoculum from the contents of the flask was inserted into

9.2 (9.3) SPHERES OF INFLUENCE IN HAWAII'S COASTAL ZONE. VOLUME 1. FEDERAL AGENCY INVOLVEMENT

Rutka, Justin, and Chennat Gopalakrishnan (University of Hawaii)
Sea Grant Advisory Report, UNIHI-SEAGRANT-AR-72-03, University of Hawaii, Honolulu, Hawaii (Mar. 1973), ix + 89 pp. Price not given.

This report is the first of a two-volume series intended to serve as focal points for the coordinated planning efforts of Hawaii's coastal zone. This volume 1 outlines the general issues of coastal resource management and provides an overview of federal agency programs in Hawaii's coastal environment. The various facets of state and county involvements will be discussed in the second volume to be published at a later date.
[5 figures, 3 tables, 62 references, appendix]

FTP

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tryptic soy broth containing labeled methylmercury bromide. After 170 hr. of incubation, the methylmercury had disappeared and the mercury appeared as Hg vapor. Four bacterial isolates obtained from the mixed culture transformed methylmercury to methane and mercury vapor. The isolates were short gram-negative rods and appeared to be Pseudomonas spp.

These results indicate that demethylating organisms inhabit mercury-containing sediments and could be responsible for degradation of some of the methylmercury present.

[3 figures, 9 references] SW

9.3 THE CONTINENTAL SHELF REDEFINITION, WITH SPECIAL REFERENCE TO THE ARCTIC

Pharand, Donat (Civil Law Section, University of Ottawa, Canada)
McGill Law Journal 18, No. 4, 536-559 (Dec. 1972)

The present discussions in the United Nations Sea-Bed Committee relative to a redefinition of the continental shelf take on special importance when the proposals are applied to the Arctic area; the Arctic has the largest continental shelves in the world. This article is a review of the meaning of the present definition of the continental shelf and a discussion of the main proposals for a redefinition in light of their application to the Arctic. The contents consist of:

I. The Present Definition of the Continental Shelf,
  a. The Notion of 'Natural Extension,'
  b. The Factor of 'Adjacency,'
  c. The Criterion of 'Exploitability.'
II. Redefinition of the Continental Shelf,
  a. U.N. Sea-Bed Activities,
  b. The U.S. Draft Convention,
  c. Urgency and Perspectives of a Redefinition.

[80 footnotes] FTP

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associated form. There appears to be regional differences in mercury levels in the coastal marine environment (earlier work showed mercury concentrations of British coastal waters of from 0.011 to 0.021 $\mu g./l.^{-1}$). However, uncertainties exist about the types and amounts of the various forms of mercury present in the marine waters and the fractions being measured. Therefore, more information is required on the distribution of the chemical forms of mercury in natural waters in order to elucidate the pathways and interactions of mercury in the estuarine and marine environment.

Location of Long Island Sound water sample	Date collected (year 1972)	Salinity of the water	Mercury concentration		
			Total	Inorganic	Organically associated
		‰	$\mu g./l.^{-1}$	$\mu g./l.^{-1}$	$\mu g./l.^{-1}$
Connecticut River	Aug. 21	0.09	0.045	0.021	0.024
Avery Point Dock	Sept. 26	29.7	0.067	0.025	0.042
Fishers Island Sound	Aug. 17	30.1	0.078	0.028	0.050
Race, Long Island Sound	Oct. 13	30.3	0.047	0.033	0.014

[2 tables, 18 references] FTP

9.2 FUNDAMENTALS OF BIOSTATISTICS

Vann, Edwin (Wayne State University)
Published by D. C. Heath and Company, Boston, Mass. (1972), 184 pp. Price not given.

This book covers the basic field of biostatistical technique for the biologist who does not have a background in mathematics, has not been exposed to the field, but has a working knowledge of college algebra. The author believes that most of the problems likely to be presented to a biologist are represented in one form or another in this book. The author warns that a well-planned experiment providing readily analyzable data is a tremendous asset and is of equal importance to the biostatistical technique. SW

9.3 NATIONAL-INTERNATIONAL JURISDICTIONAL BOUNDARY ON THE OCEAN FLOOR

Hedberg, Hollis D. (Law of the Sea Institute, University of Rhode Island, R.I.)
Occasional Paper No. 16, Law of the Sea Institute, University of Rhode Island, Kingston, RI 02881 (1972). Price not given.

This paper deals with the problem of jurisdiction over the ocean bottoms (the ocean floor and the resources on and below it) but does not consider jurisdiction over the ocean waters (the rights to navigation, fishing, etc., and the doctrine of freedom of the seas). The decision as to where the boundary between national and international jurisdiction of the ocean floor lies is now critical and urgent. This paper presents for consideration a basis for such a boundary and offers a procedure for its practical application worldwide.

The author recommends that the most natural, most equitable, and most practicably acceptable form of national-international jurisdictional boundary would consist of points fixed by geodetic coordinates of latitude and longitude connected by straight lines or arcs, lying within a zone of internationally agreed width extending oceanward from the approximate base of the continental shelf or insular slopes adjacent to the shores of coastal nations or their dependencies. The base of the continental or insular slope is the critical dividing line between that part of the ocean floor pertaining to the land areas of the world and the nations, and that part of the ocean floor which properly belongs to the ocean domain and could appropriately be placed under international jurisdiction. He further recommends that an International Marine Boundary Commission be created

9.3 ISSUES ARISING IN THE ICELANDIC FISHERIES CASE

Katz, Stephen R. (University of Wales Institute of Science and Technology)
International and Comparative Law Quarterly 22, Part 1, 83-108 (Jan. 1973)

On April 14, 1973, the British Government filed an application with the International Court of Justice asking the Court to decide

> (a) that there is no foundation in international law for the claim by Iceland to be entitled to extend its fisheries jurisdiction by establishing a zone of exclusive fisheries jurisdiction extending to fifty nautical miles from the baselines hereinbefore referred to; and that its claim is therefor invalid; and
> (b) that questions concerning the conservation of fish stocks in the waters around Iceland are not susceptible in international law to regulation by the unilateral extension by Iceland of its exclusive fisheries jurisdiction to fifty nautical miles from the aforesaid baselines but are matters that may be regulated, as between Iceland and the United Kingdom, by arrangements agreed between those two countries . . . [which] give effect to the continuing rights and interests of both of them in the fisheries of the waters in question.

The present paper is a discussion of some of the important issues that are expected to face the Court.
[83 footnotes] FTP

9.3 (9.19) AIR POLLUTION ABATEMENT: AN EXAMINATION OF THREE POLICIES

Ferrar, T. A. (Dept. of Economics, Pennsylvania State University, University Park, PA 16802)
Critical Reviews in Environmental Control 3, No. 2, 121-128 (Feb. 1973)

Three economic policies for inducing control of environmental pollution are discussed. These consist of the (linear) effluent charge policy, the property right allocation or direct discharge restriction system, and a combination of the two policies.
[4 figures, 5 references] FTP

9.3 POLITICAL COBWEBS BENEATH THE SEA

Stang, David P. (Washington, D.C.)
International Lawyer 7, No. 1, 1-15 (Jan. 1973)

About 2 years ago, the United Nations General Assembly charged (by resolution) the U.N. Seabed Committee to serve as the preparatory body for a 1973 Law of the Sea Conference. The U.S. Seabed Committee was delegated the responsibility for preparing a list of subjects and issues that should be dealt with by the Conference and to prepare draft articles for a future treaty. In this paper the author examines the results of the four sessions of the Seabed Committee during the past 2 years. The only major tangible results of the past 2 years' work of the Committee, according to the author, are two documents agreed upon at the Committee's summer 1972 session. The first document is a list of subjects and issues which should be dealt with by the Conference. The second contains draft texts of seabed principles which would be incorporated into a future draft treaty. The working group agreed that any draft text that contained language that was not necessarily acceptable would be included in brackets; thus, most of the language of the draft principles is bracketed.

Although the summer 1972 session represented a major step in the attitudinal approach of delegates to negotiations, there apparently was no consensus near on most of the major issues. The major unresolved issues of the two stated documents are:

1. Limits of the territorial sea and navigational rights of vessels and aircraft, in and over international straits that are within the territorial sea of coastal states.
2. Limits of coastal state jurisdiction over resources of the seabed adjacent to and beyond the territorial sea; also, the nature and limitations of coastal

9.3 INDICES OF NATIONAL INTEREST IN THE OCEANS

Alexander, Lewis M. (Law of the Sea Institute, University of Rhode Island, Kingston, R.I.)
Ocean Development and International Law Journal 1, No. 1, 21-49 (Spring 1973)

Each of the 148 independent States of the world has an interest in the oceans and is presumably in a position to affect, and be affected by, developments relating to jurisdiction and control in the marine environment. These interests, too, are reflected in policies regarding the international Law of the Sea. By analyzing the nature of the national marine interests a generalized model can be applied to any one of the countries and the States can be divided into groupings related to their physical, economic, historic, or other characteristics with respect to the marine environment. The basic components of the national marine interest are accessibility, investment, dependence, and control. The author believes that these components are important to an understanding of the positions of the 30 landlocked, 20 shelf-locked, and 98 other countries in the current and upcoming Law of the Sea negotiations.

Considerable useful information is presented in seven tables having the following titles: Division of States According to the Nature of Adjacent Shelves; Areas of Seabed Acquired by States Beyond the 200-Meter Isobath Through the Extension of National Jurisdictional Limits to the Outer Edge of the Continental Margin; Areas of Seabed Acquired by States Beyond the 200-Meter Isobath Through the Extension of National Jurisdictional Limits to a Distance of 200 Nautical Miles From the Coast; Rank Order of States Acquiring the Largest Area of Seabed Beyond the 200-Meter Isobath Through the Adoption of New National Jurisdictional Limits; Strategic International Straits; Breadths of the Territorial Sea and Exclusive Fisheries Claims; and States Which Have Ratified, Acceded to, or Consider Themselves Bound to the Geneva Conventions on the Law of the Sea. [28 footnotes, 7 tables] FTP

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state jurisdictional authority in such areas.

3. The nature of the fishing rights that coastal nations may obtain in high seas areas adjacent to their coasts,....

4. The measures that coastal nations may take in high seas areas adjacent to their coasts to protect themselves against marine pollution caused by foreign countries or their nationals,....

5. The measures that coastal nations may take in high seas areas adjacent to their coasts to regulate the conduct of foreign nationals of scientific research on the high seas and underlying seabed,....

6. The rights of individual nations and their nationals to explore and exploit the national resources of the seabed beyond the limits of national jurisdiction,....

It appears that the major objectives of most of the coastal countries of the world are to: (1) Extend seawardly the limits of their exclusive jurisdiction and control over fisheries, exploration and exploitation of minerals of the seabed, and scientific research conducted by foreign vessels in areas adjacent to their coasts and in other parts of the high seas; (2) minimize restrictions on their exercise of such jurisdication; and (3) establish an international organization that they would control.

The objective of the developed nations appear to be to preserve the largest possible area of the high seas, and within that area retain with mineral restrictions the rights to exercise high seas freedoms (particularly the freedom to navigate, fish, and conduct scientific research on the high seas, and to retain this high seas freedom subject only to reasonable international regulation; to mine the minerals of the ocean floor beyond the limits of coastal nation jurisdiction). [9 footnotes] FTP

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under the aegis of the United Nations to designate worldwide an approximate position for a base-of-slope line for this purpose, and that the United Nations decide on the width of the zone oceanward from this line within which the International Boundary Line should lie. Each coastal nation then could designate its own exact boundary within this zone which, subject to the certification of the International Marine Boundary Commission that it was within the agreed zone, would then be presented to the United Nations for ratification.

A draft copy of an atlas of some hundred bathymetric maps is in preparation to accompany this paper. These drafts will have drawn on them tentative base-of-slope lines and alternative boundary zones of 100, 200, and 300 km. width, respectively, oceanward from the base-of-slope lines. The atlas is being prepared only to give a rough appraisal of the feasibility of drawing the base-of-slope lines and to show the effects of boundary zones of different widths. Pending completion of the atlas, the present paper contains eight reduced-size samples of the original 16 in. by 20 in. atlas sheets.
[2 figures, 8 references, 15 attachments] FTP

9.3 WORLD FISHERIES POLICY: MULTIDISCIPLINARY VIEWS
(9.6)

Rothschild, Brian J. (editor) (National Marine Fisheries Service, NOAA, La Jolla, Calif.)
University of Washington Press, Seattle, WA 98105 (1972), xix + 272 pp. Price $9.50.

This book is the fourth volume of a series called "Public Policy Issues in Resource Management." Volume IV is a collection of papers presented at seminars held in 1970-71 at the University of Washington. The subjects cover a wide array of issues. Some of the highlights are several chapters on the legal aspects of international fisheries. These cover disputes, world laws to prevent disputes, and agreements toward management of multinational fisheries. Other chapters are given to discussions of the current and future policies of the United States regarding international fishing arrangements. Fisheries management objectives as such are described in chapters that cover the activities of underdeveloped countries. The critical limitations of the sea as a source of food in relation to population are considered in a chapter which also contains suggestions for maintaining the fisheries. Each chapter concludes with a bibliography, and the book has an index.

The other four volumes in this series are: "The Fisheries: Problems in Resource Management," edited by James A. Crutchfield; "Water Resources Management and Public Policy," edited by Thomas H. Campbell and Robert O. Sylvester; "Weather Modification: Science and Public Policy," edited by Robert G. Fleagle; and "Ocean Resources and Public Policy," edited by T. Saunders English. SW

9.3 (8.7) THE CODEX ALIMENTARIUS COMMISSION UNDER INTERNATIONAL LAW

Shubber, Sami (Baghdad University, Baghdad, India)
International and Comparative Law Quarterly 21, No. 4, 631-655 (Oct. 1972)

The Codex Alimentarius Commission, an international organ, arose through the cooperative actions in the food standards field between the World Health Organization (WHO) and the Food and Agriculture Organization (FAO). The Commission is one of two organs under the Joint FAO/WHO Food Standards Program (the other organ is the Executive Committee). This article discusses the powers of the Codex Alimentarius Commission. These are: (1) Formulation of proposals for and advice to the Director-Generals of WHO and FAO, on matters pertaining to the implementation of the Joint FAO/WHO Food Standards Program, (2) The establishment of subsidiary bodies, (3) The preparation of food standards, (4) Publication of food standards, and (5) The coordination of work on food standards. In addition, the article considers the legal nature of codex standards. The membership of the Commission now stands at 93 member States. The work of the Codex Alimentarius Commission may lead to the creation of a mature system of food standards, including national food legislations based on such standards, with the objectives of protecting the health of the consumer and the reduction of barriers and discrimination in the food trade. [100 footnotes] FTP

9.3 FREEDOM OF PASSAGE THROUGH INTERNATIONAL STRAITS: COMMUNITY INTEREST AMID PRESENT CONTROVERSY

De Rocher, Frederic G.
Sea Grant Technical Bulletin No. 23, University of Miami, Coral Gables, FL 33149 (Nov. 1972), 129 pp. Price $3.00.

The problem of passage rights through international straits is potentially one of the most critical and devisive issues for the forthcoming Conference on the Law of the Sea. In this thesis the author attempts to (1) identify the current facts which give rise to the issue, (2) identify the claims advanced relative to international straits by the international community and by the coastal states, (3) trace the manner in which the problems of passage through international straits have arisen, and (4) offer some criteria that may characterize an internationally acceptable solution to the problem of passage through international straits and outline a basis for accommodating conflicting interests.

The author suggests that the apparent paramount coastal state concern is the legitimate desire to be secure from adverse impact on its environment--a threat which is more intense within international straits. A first step toward optimum solution of the straits passage issue is the demonstration by the international community of some real concern for the danger to coastal states by the present lack of effective concern for maritime safety. Some effective multilateral regulation in the form of an international shipping convention is necessary. Further, coastal states should renounce any ambitions for either monetary or ideological toll gates across international straits; the legitimate interest at stake is purely

9.3 THE SURGE OF SEA LAW

Wurfel, Seymour W. (Law School University of North Carolina)
Sea Grant Publication UNC-SG-73-01, Sea Grant Program, School of Public Health, University of North Carolina, Chapel Hill, NC 27514 (Mar. 1973), 247 pp. Price not given.

These 27 law-of-the-sea papers were prepared in 1972 by students of International Law at the School of Law of the University of North Carolina. The papers are published in this single volume to make readily available a representative condensation of current thinking, practices, and aspirations in the law of the sea.

Seymour W. Wurfel, "Introduction," p. i;
Page Dees, "A Brief Historical Survey of Freedom of the Seas," p. 1;
Jack W. Abel, "Crisis in the South Pacific: Tunaboat Seizures," p. 18;
Lynn Allison, "Jurisdiction in National Waters," p. 29;
Douglas M. Martin, "The Blockade "Exception" to Territorial Water Jurisdiction," p. 43;
William E. Rabil, Jr., "The Antarctic Treaty: A Stepping Stone to the Development of an International Seabed Regime," p. 51;
Thomas R. Suher, "Toward an Agreement on the External Delimitation of the Territorial Sea," p. 59;
A. Wilder Wadford, Jr., "The Attitude of Developing Countries Toward International Agreements on Environmental Control of the Ocean," p. 68;
Albert M. Neal, Jr., "The International Seabed Regime: Proposals and Prospects for Realization," p. 75;
Bryan W. Pittman, "The Marine Environment and Toxic Substances," p. 82;

9.4 (9.7) HOW 'SEA GRANT PROGRAM' ASSISTS U.S. FISHERIES

Abel, Robert B. (National Sea Grant Program, NOAA, Rockville, MD 20852)
Fishing News International 12, No. 3, 29-32, 33 (Mar. 1973)

The Sea Grant Program was established by a congressional act in October 1966 after national goals regarding marine resources were developed by concerned people in the fields of education, government, and industry. The purpose of the program is (1) to make use of the marine resources in the offshore waters of the United States (These resources include animal and vegetable life and minerals.); (2) to develop skilled manpower and equipment necessary to use the resources; and (3) to promote economic opportunities in the use of these resources. Initially, implementation of the program was assigned to the National Science Foundation. In 1970, the Sea Grant Program was transferred to the newly created National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce. Sea Grant is an independent office which reports directly to the NOAA administrator.

In 1971, the Secretary of Commerce officially designated the first Sea Grant colleges. They were Texas A & M and the Universities of Washington, Rhode Island, and Oregon State. Two more were announced in 1972: the Universities of Wisconsin and Hawaii. The Sea Grant activities of these schools emphasize three functions: research and development, education and training, and advisory services.

Of the activities in the schools, Sea Grants support the following projects. The University of Washington will attempt a total systems analysis of the North Pacific fisheries. The Univ. of Rhode Island will develop a systems model for monitoring Narragansett Bay using an integrated approach. The marine advisory

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Geoffrey Alan Planer, "The Disposal of Radioactive Wastes into the Sea: Some International Legal Considerations," p. 98;
John Pendergrass, "The Law of Maritime Oil Spills," p. 108;
Keith Hennessee, "Legal Action To Curb Pollution of the Sea," p. 119;
Bill Raney, "International Conservation of Marine Mammals," p. 129;
John M. Geil, "Offshore Oil Drilling: A Comparison of State Laws," p. 138;
Robert L. Mullinax, "International Protection of Marine Life From the Effects of Pollution Due to Land-Related Activities," p. 147;
Anderson Haynes, "Attitudes of Distant Fishing Nations to the Conservation of Fishery Resources," p. 155;
Paul Carruth, Jr., "African Attitudes Toward the Law of the Sea," p. 166;
Noel Allen, "Cooperation Between Canada and the United States of America in the Conservation of the Living Resources of the Seas," p. 178;
George Wood, "Colombia's View of Maritime Legal Problems," p. 191;
W. Vance Brown, II, "French Law and the Policy Toward Pollution in the Mediterranean," p. 198;
Michael A. Jacobs, "Israel's View of Her Maritime Legal Problem," p. 204;
C. Edward Alexander, "The Japanese Legal Approach to Marine Pollution," p. 209;
James Hugenschmidt, "The People's Republic of China's View of Contemporary Maritime Legal Problems," p. 214;
Elmo Zumwalt III, "Primary Elements Influencing the Development of the Legal Regime of Soviet Territorial Waters," p. 223;
R. L. Moore, "The Application of the Jones Act to Foreign Seamen and Foreign Flag Operations," p. 230;
John Morgan, "Actions for Personal Injury and Wrongful Death in Maritime Surroundings," p. 236. FTP

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service program of Oregon State is considered to be a model for the Nation, and it has concentrated on helping the Northwest fishing industry, from fishermen to processors. Texas A & M has developed, with industrial and local governmental cooperation, the first commercial shrimp ponds in the state. The Univ. of Wisconsin has been treating problems of the Great Lakes and the ocean with the aid of existing competence. The Univ. of Hawaii program has concentrated on the needs and opportunities of the Hawaiian Islands and U.S. Trust Territories; they also have a program of human performance in the sea.

The advantages of the Sea Grant Program lie in the stability of funding on which competent investigators may rely, and continuing projects may be accomplished. [5 photographs] SW

9.4 COMMERCIAL OPERATORS 1972

Anonymous
State of Alaska, Dept. of Fish and Game Statistical Leaflet No. 24, (1972), 16 pp., Juneau, Alaska. Price not given.

This booklet contains lists of Alaskan commercial fisheries processors who operated in 1972, with mail addresses, plant locations, and products they marketed. The lists are in three parts: Part I gives salmon (including eggs) processors, part II gives shellfish processors, and part III gives miscellaneous fish processors. These include processors of black and ling cod, fresh and frozen; halibut, fresh and frozen; herring, cured, salted, frozen, bait, and eggs; red snapper, fresh,frozen; steelhead and smelt, frozen. MS

9.3 PACEM IN MARIBUS
[PEACE IN THE OCEANS]

(Various volumes as listed below)
Royal University of Malta Press, Malta (1971). Prices not given.

A series of documents have been issued related to and dealing with the Pacem in Maribus Convocation (An International Convocation to Explore Peaceful Uses of the Oceans and the Ocean Floor) held in Malta on June 28 through July 3, 1970. These include the following volumes:

"Quiet Enjoyment: Arms Control and Police Forces for the Ocean" (Proceedings of the Preparatory Conference on Arms Control and Disarmanent, Jan. 1970), edited by Elizabeth Young and Lord Ritchie-Calder of Balmashannar, Vol. 1, 198 pp.

"Legal Foundations of the Ocean Regime" (Proceedings of the Preparatory Conference on the Continental Shelf and Legal Framework, Jan.-Feb. 1970), Vol. 2, 242 pp.

"Planning and Development in the Oceans" (Proceedings of the Preparatory Conference on Planning and Development, Feb. 1970), Vol. 3, 170 pp.

"Ocean Enterprises" (A Special Report on a Preliminary Conference held in Preparation for the Pacem in Maribus Convocation at Valletta, Malta, June 28-July 3, 1970), edited by Elaine H. Burnell and Piers von Simson, Vol. 4, 170 pp.

"The Ocean Environment" (Proceedings of the Preparatory Conference on Ecology and the Role of Science, Apr. 1970), Vol. 5, 268 pp.

"Selected Bibliography," compiled by Wolfgang Vitzthum, Vol. 6, 44 pp.

"Proceedings Pacem in Maribus Convocation, Malta, June 28-July 3, 1970," Vol. 7, 116 pp. FTP

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one of physical integrity of the coastal state. Also, the definition of innocent passage should make clear with respect to commercial traffic that (a) within the territorial sea, activities prejudicial to recognized legitimate coastal state interests may be prohibited and (b) commercial passage is innocent as long as it does not unreasonably threaten the physical environment of the coastal state.

For commercial purposes then, the critical elements of innocence are adherence to a multilateral Shipping Convention, the upgrading of maritime safety generally, and the adherence to multilaterally-determined routings for vessels presenting special environmental hazards.
[242 footnotes] FTP

2.3 PURIFICATION OF WASTE WATERS FROM FOOD-INDUSTRY PLANTS

Lorents, V. I. (Budivel'nik, Kiev, Ukr., U.S.S.R.)
Chemical Abstracts 78, No. 8, 47542d (Feb. 26, 1973)

9.6 MICROBIOLOGY OF FOODS AND FOOD PROCESSING
(2.01)(2.05)

Nickerson, John T., and Anthony J. Sinskey (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Mass.)
American Elsevier Publishing Co., Inc., New York, N.Y. (1972), 306 pp. Price $12.50.

This book contains information that will be of interest to those involved in food manufacturing, food catering, and preparation and serving of foods in restaurants and institutions. Microbiological examination of foods using various techniques is covered in the first chapter. Individual chapters describe the microbiology of dried food, meat and eggs, fruits and vegetables, and dairy products. Preservation by heating, freezing, and by chemical means are covered in three chapters. Foodborne infections and intoxications are discussed in two chapters, and the last chapter deals with sanitation in food-manufacturing plants, and in food preparation and serving establishments. Each chapter has references and the book has an index. SW

3.3 FOOD CANNING TECHNIQUES
(9.6)
Gutterson, M.
Food Processing Review 26, vii + 238 pp. (1972). Published by Noyes Data Corp., Park Ridge, N.J. Price $36.00.
Food Science and Technology Abstracts 4, No. 12, 12E458, p. 23 (Dec. 1972)

This book on commercial food canning techniques is based on relevant patents dating back to 1963. The information can be used as a guide to U.S. Patent literature in this field and is arranged under the following topics: "General" (canning systems, aseptic canning, closure techniques, can coatings, deoxygenation, containers, chemical preservatives), pp. 3-60; "Meat and Poultry," pp. 61-110; "Fish and Sea-Food," pp. 111-146; "Vegetables, Fruits, and Juices," pp. 147-183; "Dairy Products," pp. 184-205; "Beverages," pp. 206-214; "Cereals," pp. 215-223; and "Miscellaneous Product" (coffee, eggs, aerosols), pp. 224-233. The table of contents is arranged to serve as a subject index. Company, inventor, and patent number indexes are shown. SW

9.7 COMPUTER-BASED ABSTRACT SERVICE NOW AVAILABLE

Stewart, George F. (Dept. of Food Science and Technology, University of California, Davis, CA 95616), and Calvert L. Willey (Institute of Food Technologists, 221 N. LaSalle St., Chicago, IL 60601)
Food Technology 27, No. 5, 31, 35-36 (May 1973)

Abstracts of papers and of food patents are put on tapes for generating indexes and for printing Food Science and Technology Abstracts (FSTA). FSTA is an abstract journal covering over 1,000 journals and is published by the International Food Information Service (IFIS). IFIS is under the direction of the Institute of Food Technologists, the Commonwealth Agriculture Bureaux (England), Institut für Dokumentationswesen (Germany), Centrum voor Landbouwpublikaties en Landbouwdocumentatie (Netherlands), and Zentrastelle für Maschinelle Dokumentation (Germany). IFIS is now producing searchable tapes of FSTA for use by the Institute of Food Technologists in the United States and Canada, and for the other agencies in IFIS. The computer tapes contain all the information published in FSTA, and they have been edited and their format designed to search out and print out selected abstracts. Also, selective print-outs of abstracts covering standard subject matter categories can be provided.

Two information centers for this service are the North Carolina Science and Technology Research Center, P.O. Box 12235, Research Triangle Park, NC 27709 and Computer Search Center, Illinois Institute of Technology Research Institute, 10 West 35th St., Chicago, IL 60616. Information on the availability and costs of the services may be obtained by writing to one of these centers. FTP

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

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0.33 FREEZING BEHAVIOR OF FISH BLOOD GLYCOPROTEINS WITH ANTIFREEZE PROPERTIES

Raymond, J. A., and A. L. DeVries (Scripps Institution of Oceanography, University of California, La Jolla, CA 92037)
Cryobiology 9, No. 6, 541-547 (Dec. 1972)

The ability of polar fishes to resist freezing has been attributed in other reports either to supercooling of the blood or to increased levels of sodium chloride or glucose in the blood. One of the authors (DeVries) previously reported that large molecular weight (MW) glycoproteins, found only in Antarctic species, lowered the blood freezing point of some of these fishes. In continuing work on glycoproteins, studies were performed on freezing curves of serum and glycoprotein solutions, the effect of glycoproteins on the structure of ice, and the relation of freezing point depression (FPD) to the rate of freezing and MW of participating compounds.

Serum and glycoprotein were obtained from Antarctic fishes by the method of DeVries [A. L. DeVries, S. K. Komatsu, and R. E. Feeny. J. Biol. Chem. 245, 2901-2908 (1970)]. Freezing curve studies were conducted on 0.5 ml. samples with ice crystals. Glycoproteins of known MW were cleaved by incubating with subtilisin. Average MWs were determined by obtaining the total number of amino groups in the molecule remaining after cleavage.

The freezing curves of large MW glycoproteins showed a flat section indicating a long period before freezing was complete. The smaller MW glycoproteins exhibited

0.33 FLUORESCENT PRODUCTS IN A GLUCOSE-GLYCINE BROWNING REACTION

Adhikari, H. R., and A. L. Tappel (Dept. of Food Science & Technology, University of California, Davis, CA 95616)
Journal of Food Science 38, No. 3, 486-488 (Mar.-Apr. 1973)

Earlier published studies have described the development of fluorescent products in nonenzymatic browning reactions and have demonstrated that the fluorogens are precursors of the brown pigments, but are not identical with them. Because browning does not affect the formation of fluorescent products and the resultant deterioration of nutritional quality, measurement of fluorescence might be more useful than browning to assess nutritional quality. The purpose of the present study was to find out whether fluorescence could be used as a quantitative measure of the browning reaction and to partially identify the associated fluorescent chromophores. The reaction system was based on that of H. S. Burton, D. J. McWeeny, and D. O. Bitcliffe [J. Food Sci. 28, 631 (1963)]. Aqueous solutions of glucose and glycine (2 and 1 molar, respectively) mixtures were heated at 100° C. (pH 5.0-5.2), and aliquots were removed at periodic intervals and analyzed with a spectrophotofluorometer. In addition, the effects of pH and metal chelating agents on the fluorescent products were examined. The pH of the diluted reaction mixture was adjusted with 1N NaOH and 1N HCl. The metal chelating agent used was Europium III 2,2,6,6-tetramethyl heptane-1-3-dione.

Fluorescence spectra of the products (and the results of the effects of pH and metal chelation on the fluorescence) indicated that the chromophoric group is a

0.35 STRUCTURE OF THE LIPID PHASE IN CELL ENVELOPE VESICLES FROM HALOBACTERIUM CUTIRUBRUM

Esser, Alfred F., and Janos K. Lanyi (Biological Adaptation Branch, Ames Research Center, National Aeronautics and Space Administration, Moffett Field, CA 94035)
Biochemistry 12, No. 10, 1933-1939 (May 8, 1973)

The bacterium H. cutirubrum is extremely halophilic and requires sodium chloride levels of at least 3 M for growth; it lyses readily when the salt level is less than 1 M. The envelop of the cell of this organism is made up mostly of lipoproteins and contains over 90% of the cellular phosphorus. The major phospholipid is phosphatidyl glycerophosphate which contains two ether-linked long phytanyl side chains. The remaining lipids and carotenoids are phytyl derivatives; thus, the authors state, the hydrocarbon part of the membrane seems to be fairly uniform. These bacteria are able to accumulate potassium ions against a large concentration gradient. The intracellular potassium, at a concentration of almost 3 M, is not bound to an intracellular matrix. This organism, because it does not have a rigid cell wall and because of the remarkable physicochemical and metabolic properties of its cell envelope, is a valuable tool for investigating structure-function relationship in membranes. In the present study, the researchers examined the physical state of the lipid phase in the cell envelop of H. cutirubrum by incorporating spin-labeled fatty acids into membrane vesicles. Fatty acid derivatives of the general formula $CH_3(CH_2)_m$-$CR(CH_2)_n COOH$ (R = N-oxyl-4',-4'-dimethyloxazolidine) were used as probes.

0.35 (9.16) PARADOXICAL EFFECTS OF SALINITY REDUCTIONS ON LOBSTERS (HOMARUS AMERICANUS) INFECTED WITH GAFFKYA HOMARI

Stewart, James E., and B. Arie (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Comparative Biochemistry and Physiology 45, No. 3A, 717-730 (July 1, 1973)

Although lobsters can adapt to a relatively wide range of salinity, they adapt to reductions in environmental salinity rather slowly. Inasmuch as many lobsters live in coastal areas near the shore where salinity changes can be frequent and rapid, they must be able to cope with these naturally occurring stress factors. It is possible that the stress factor could be extremely severe for those lobsters held captive in inshore commercial holding pens where runoff from the land can bring out rapid changes in the salinity of the shallow water. The fatal bacterial disease gaffkemia (caused by Gaffkya homari) may impose an additional stress. This paper dexcribes the effects that reductions in salinity from a normal coastal value of 31.8 ‰ had on the time to death of lobsters infected with G. homari and the resulting physiological changes in the hemolymph of infected and healthy lobsters.

When the lobsters were first acclimated to reduced environmental salinities of 26.1 ‰ and to 21.5 ‰ prior to their infection with G. homari, their times to death were shortened to 9 and 5 days, respectively, from the 13 days recorded at the coastal (normal) salinity of 31.8 ‰. However, when the lobsters were first infected with the organism and then acclimated to a salinity of 26.1 ‰, their times to death

0.33

Schiff-base in conjugation with an electron donating group. The fluorescence products were mainly polymers. The structure of the chromophoric system could be:

(1) HO-C(=O)-CH$_2$-N=CH-CH=C(OH)-NH-

(2) HO-C(=O)-CH$_2$-N=CH CH=C-

The researchers examined several foods (including breakfast cereal, toasted white bread, coffee) which undergo carbonyl-amine reactions during processing and found that they contained similar fluorescence products. The authors suggest that fluorescence can be used as a quantitative measure of the browning reaction. FTP
[4 figures, 15 references]

0.35 (9.16)

increased progressively from the sixth day of infection onward. Reduction of infected lobsters to a salinity of 21.5 ‰ increased the time to death to 18-20 days. The authors were not able to offer a logical explanation for these results.
Information is given on hemolymph total carbohydrates, glucose, lactic acid, serum osmolalities, and pathogen numbers that were measured during the course of the experiments. FTP
[13 figures, 23 references]

0.35 (1.85)

BIOSYNTHESIS OF ASTAXANTHIN. VI. CAROTENOIDS IN THE PRAWN, PENAEUS JAPONICUS. II.

Katayama, Teruhisa, Tadashi Katama, and C. O. Chichester (Fac. Fish., Univ. Kagoshima, Kagoshima, Japan) Chemical Abstracts 78, No. 7, 40658h (Feb. 19, 1973)

0.33

freezing curves that were not as flat and were not effective in FPD as the larger MW glycoproteins. The authors found that the FPD produced by glycoproteins is closely related to their affinity for ice; that is, the more active, larger glycoproteins have a higher affinity for ice than the smaller. The authors attribute this characteristic to binding of hydroxyl groups on the glycoprotein to oxygen molecules on the ice. For smaller MW glycoproteins, lowering the freezing point was found to be dependent on the rate of freezing; that is, the lower the temperature, the faster heat is removed from the sample and the faster it freezes. This response is not found in larger MW glycoproteins. Studies on the freezing curves of serum yielded indications that it behaved as if it were supercooled; that is, there was variability in the freezing point. In addition, at faster freezing rates, the serum behaved in a fashion similar to lower MW glycoproteins. Since 80% of the serum consisted of low MW glycoproteins, this result was expected. SW
[6 figures, 18 references]

0.35 (2.2)

FORMATION OF NONVOLATILE AMINES DURING LOSS OF FRESHNESS AND PUTREFACTION IN VARIOUS SPECIES OF SHELLFISH MUSCLE

Takagi, Mitsuzo, Atsushi Iida, Hanako Murayama, and Suga Soma (Fac. Fish., Hokkaido Univ., Japan) Chemical Abstracts 78, No. 7, 40755s (Feb. 19, 1973)

0.33

EFFECT OF HEATING ON THE HYDROLYSIS OF FISH CONNECTIVE TISSUE

Sadukasov, T. S. (Astrakh. Tekh. Inst. Rybn. Prom. Khoz., Astrakhan, U.S.S.R.) Chemical Abstracts 78, No. 7, 41723s (Feb. 19, 1973)

0.35

The membranes of the cell envelop of H. cutirubrum differed from isolated lipids in that (1) the polarity around the spin-label group of labels where [m,n] = [12,3], [7,6], and [5,10] is considerably higher in membranes than in lipids, (2) the order parameter, S_n, in membranes is unusually high and nearly constant for $n < 14$, while in lipids the usual flexibility gradient was observed for this region, and (3) thermal transitions for labels [12,3] and [5,10] occurring in lipid dispersions, as evidenced by the temperature dependence of $\underline{S}$ or of the motion parameter, τ, are absent in membranes. For label [1,14], the environment around the nitroxyl group was similar in both membranes and extracted lipids, and a thermal transition occurred at the same temperature in both systems. It appears that in H. cutirubrum cell envelopes the membrane proteins cause all but a narrow center portion of the lipid bilayer to become more ordered. Inasmuch as the lipid content of these membranes is low (lipid to protein ratio is <0.2), the authors think it possible that such immobilization is due to the existence of a protein matrix in the membrane. FTP
[6 figures, 2 tables, 41 references]

0.39 STUDIES ON THE DISCOLORATION OF RED FISHES

Tsukuda, Nobuo
Bulletin of Tokai Regional Fisheries Research Laboratory, Tokyo, Japan, No. 70, 103-174 (Aug. 1972) (In Japanese, English abstract)

The skin of food fish such as the rockfishes (Sebastes spp.), the gurnards (Chelidonichthys kumu and Lepidotrigla güntheri), and others contain red colors which fade during storage, transport, and processing. Consumers in Japan rely on the unfaded color in these fishes as an indicator of freshness. The color in the red fishes is due to carotenoid and melanoid pigments. Since melanoid pigments are stable, the author concluded that discoloration of the red color is due to changes in the carotenoid pigments. To determine the cause of the changes, the carotenoids and their concentrations in red fishes were investigated.

Astaxanthin was found to be the predominant variety of carotenoid in the color of the red fishes; it comprised more than 50% of the total carotenoids. In addition, tunaxanthin was found to be the other major component of the carotenoids in the red fishes. A small quantity of violaxanthinlike pigment, and some unidentified pigments, may be present also.

Tests of color retention were performed on red fishes in iced and in frozen storage. Fishes in iced storage kept their color for 5 to 8 days; after this period they began to lose their colors. Fish kept at -3° C. were discolored during 35 days of storage. At -18° and -30° C. discoloration could not be stopped after 50 and 75 days, respectively, of storage. Astaxanthin isolated from fish skin was found to be discolored upon exposure to ultraviolet light. Wrapping the container

0.5 (2.05) EFFECT OF SELECTED LACTIC ACID BACTERIA ON GROWTH OF STAPHYLOCOCCUS AUREUS AND PRODUCTION OF ENTEROTOXIN

Haines, William C., and L. G. Harmon (Dept. of Food Science and Human Nutrition, Michigan State University, East Lansing, MI 48823)
Applied Microbiology 25, No. 3, 436-441 (Mar. 1973)

Certain bacteria are able to inhibit the growth of S. aureus. Some lactic acid producing organisms inhibit both growth of S. aureus and its production of enterotoxin when grown in associative culture. Although the pH of mixed cultures is indicative of the potential for growth of the staphylococci, it is not clear whether the inhibition of growth is related to the production of lactic acid. This study examined the ability of certain lactic acid bacteria to affect growth and production of toxin by enterotoxigenic staphylococci.

S. aureus 243, which produced enterotoxin B, was used. The effector organisms used were Streptococcus lactis A62, A64, A254, G18, W, C24, and 11454; S. cremoris E8 and S. thermophilus W; Pediococcus cerevisiae FBB39, FBB63, 10791, and "accel"; Lactobacillus casei 54, L. plantarum FBB12, and L. bulgaricus W; and Leuconostoc citrovorum W. The Staphylococcus aureus 243 and effector organism were grown in associative culture in APT broth.

The streptococci inhibited both growth of S. aureus and production of enterotoxin to a greater degree than did any of the other lactic acid bacteria; the P. cerevisiae were next in degree of effectiveness. The lactobacilli and Leuconostoc citrovorum did not inhibit growth of S. aureus and only slightly inhibited production of enterotoxin. Enterotoxin was present in all cultures in which the population of S. aureus reached 8×10^7 per milliliter; no enterotoxin was detected when

0.5 (3.33)(2.05) EFFECT OF NITRITE AND NITRATE ON TOXIN PRODUCTION BY CLOSTRIDIUM BOTULINUM AND ON NITROSAMINE FORMATION IN PERISHABLE CANNED COMMINUTED CURED MEAT

Christiansen, L. N. (Swift and Company, Research and Development Center, Oak Brook, IL 60521), R. W. Johnston, D. A. Kautter, J. W. Howard, and W. J. Aunan
Applied Microbiology 25, No. 3, 357-362 (Mar. 1973)

The purpose of this overall collaborative study was to determine the minimal levels of nitrite or nitrate, or both, necessary for the control of botulinal toxin production in several types of cured meat products. This paper, the first in a series, reports on comminuted ham. Comminuted ham (containing added sodium chloride, 2.5%; dextrose, 0.5%; and sodium isoascorbate, 0.02%) was formulated to contain different levels of sodium nitrite and sodium nitrate, inoculated with spores of C. botulinum, packed in cans under vacuum, and pasteurized to an internal temperature of 68.5° C. Nitrite was tested at seven levels (50, 100, 150, 200, 300, 400, and 500 µg./g.), and nitrate was tested at three levels (500, 1,000, and 2,000 µg./g.). Current federal regulations permit up to 200 µg. of nitrite per gram of meat, and 500 µg. nitrate per g. of meat. Two inoculum levels were used of about 100 and 10,000 spores per g. of meat. Holding temperature was 7° C. and 27° C.; storage period was 168 days.

The levels of nitrite, upon addition to the meat, decreased; cooking had little effect on the levels. Nitrite levels decreased more rapidly during storage of the samples at 27° C. than at 7° C. The amount of nitrite added to the comminuted ham greatly influenced the growth of and the toxin production of C. botulinum. Also,

0.5 GROWTH AND ENTEROTOXIN PRODUCTION BY VARIOUS STRAINS OF STAPHYLOCOCCUS AUREUS IN SELECTED FOODS

Scheusner, D. L., and L. G. Harmon (Dept. of Food Science & Human Nutrition, Michigan State University, East Lansing, MI 48823)
Journal of Food Science 38, No. 3, 474-476 (Mar.-Apr. 1973)

Earlier work indicated that growth of S. aureus sometimes occurred in foods without detectable amounts of enterotoxin being formed. It appears that the presence of competitive organisms may have a major effect on enterotoxin production. In the present study, the researchers examined the potential for growth and enterotoxin production by various strains of S. aureus inoculated into various food products. Various strains of S. aureus were inoculated into different commercial food products, and the test samples were then incubated at 21° C. for from 48 to 119 hr. The food samples included doughnut and jelly; pastry cream fillings; salad dressing; creamed herring; ham salad; frozen beef, chicken, tuna, and turkey pot pies; canned beef stew; cream pies; rice pudding; and others.

Foods in which measurable amounts of enterotoxin were found had an initial pH of 5.1 to 6.60, and the terminal S. aureus count ranged from 1.7×10^7 to 5.7×10^8. The initial total bacterial count of these same foods varied from <10 to 3.0×10^2 per gram, and the terminal total bacterial count varied from 7.9×10^7 to 4.3×10^9. During incubation of inoculated foods with an initial pH below 5.0, there was a decrease in the S. aureus population, and the total bacterial population either decreased or remained stable. The authors found that the various strains of S. aureus

0.5 (3.33)(2.05)

the level of nitrite required to effect complete inhibition depended upon the inoculum level. There was no botulinal toxin production or putrefaction in the samples stored at 7° C. for 6 months. Toxin was produced in samples containing 150 µg. nitrite per g. sample and an inoculum of 90 spores per g. sample; no toxin production occurred in samples with the same size inoculum but formulated with 200 µg. nitrite per g. Toxin was detected in samples containing 400 µg. nitrite per g. and inoculated with 5,000 spores per g.; toxin was not found in samples with the same size inoculum but formulated with 500 µg. nitrite per g.

Analyses of selected comminuted ham samples containing different levels of nitrite or nitrate, or both, gave negative results for 14 volatile N-nitrosamines at a sensitivity of 0.01 µg. of nitrite or nitrate per g. of meat. The analyses were made for the following volatile N-nitrosamines: dimethylamine, methylethylamine, diethylamine, methylpropylamine, ethylpropylamine, dipropylamine, ethylbutylamine, propylbutylamine, methylamylamine, dibutylamine, piperidine, pyrrolidine, morpholine, and diamylamine.

These data show clearly that nitrite significantly inhibits production of toxin by C. botulinum in perishable canned comminuted cured ham if the product is temperature abused. Also, the nitrite level in the meat product at the time of formulation is important rather than the residual nitrite level in the product during storage.
[3 figures, 6 tables, 19 references] FTP

0.5

used produced enterotoxins A, B, C, and D in vanilla pudding with initial pH of 6.37 over a temperature range of 19°-45° C.

Thus, growth of S. aureus may occur without production of enterotoxin. Enterotoxin production appears to have some relationship to pH but not to the kind of food in which growth occurred. For example, enterotoxin was produced in inoculated sweet potato (pH 5.51) and in inoculated coconut cream pie (pH 6.60), but no measurable enterotoxin was produced in any food with a pH below 5.0.
[3 tables, 12 references] FTP

0.39

in red-colored cellophane prevented discoloration of the astaxanthin upon exposure to sunlight. The discoloration rate differed with the solvent that was mixed with astaxanthin. Discoloration was rapid with chloroform and acetone and less rapid with petroleum ether, benzene, and glacial acetic acid; astaxanthin was fairly stable with ethyl ether, ethanol, methanol, and carbon disulfide. Aqueous extracts of skin, liver, and muscle tissue from various fishes were tested for their ability to discolor the carotenoids. Skin extracts had strong ability to discolor, and muscle and liver extracts were not very active. The author concluded that the skin tissues contain a lipoxidaselike enzyme which participates with other physical and chemical activity in causing discoloration of the carotenoids.
[59 figures, 19 tables, 73 references] SW

0.5 (2.05)

the S. aureus population was less than 4×10^7 per ml. It appears that competition for vital nutrients, particularly niacin and biotin, and the production of hydrogen peroxide may contribute to the inhibition. The production of lactic acid by the associative organisms appears to inhibit the growth of S. aureus in the early stages of incubation but not in the later stages.
[2 figures, 5 tables, 21 references] FTP

0.39 INORGANIC CONSTITUENTS PRESENT IN DNA AND RNA

Hamilton, E. I., and M. J. Minski (Radiol. Prot. Serv., Belmont/Sutton, Surrey, England)
Chemical Abstracts 78, No. 7, 39524j (Feb. 19, 1973)

0.5 (4.2) PHYSICOCHEMICAL AND ANTIBACTERIAL PROPERTIES OF DIFFERENT WHALE FAT FRACTIONS

Lyubeznov, V. N., and S. S. Popova (U.S.S.R.)
Chemical Abstracts 78, No. 7, 38710e (Feb. 19, 1973)

0.5

CONTROL OF STAPHYLOCOCCUS AUREUS IN SAUSAGE BY STARTER CULTURES AND CHEMICAL ACIDULATION

Daly, C., Michele La Chance, W. E. Sandine, and P. R. Elliker (Dept. of Microbiology, Oregon State University, Corvallis, OR 97331)
Journal of Food Science 38, No. 3, 426-430 (Mar.-Apr. 1973)

Successful production of certain fermented sausage products (thuringer, cervelat, pepperoni) requires strong fermentation to give the desired preservative, flavor, and texture characteristics. Some manufacturers use starter cultures of suitable lactic acid bacteria; recently cultures of Pediococcus cerevisiae were made available commercially in frozen form. Starter cultures improve the uniformity of sausages and shorten the production cycle. The presence of Staphylococcus aureus in sausage products can pose a serious public health problem. In this study, the researchers examined the effect of commercially available starter cultures on the growth and survival of S. aureus in sausage meat product incubated at 21°, 30°, and 37° C. Also, tests were carried out using citric acid and glucono-delta-lactone (GDL) as acidulants with and without added starter culture. The test sausage mixture consisted of cold ground beef base, glucose, salt, and sodium nitrate. For the inoculated packs, appropriate dilutions of an 18-24 hr. culture of S. aureus were added to the sausage mixture. Starter cultures were then added to the sausage emulsion. The test samples were placed in 50-ml. beakers, which were then covered and stored at 21°, 30°, or 37° C. When the chemical acidulants were used, they were added to the sausage emulsion prior to the addition of the culture of S. aureus. The starters used were P. cerevisiae, Lactobacillus plantarum, and a mixture of the two.

0.5
(2.05)

PHENOTYPIC CHARACTERIZATION OF BENECKEA PARAHAEMOLYTICA: A PRELIMINARY REPORT

Baumann, Paul, and Linda Baumann (Dept. of Microbiology, University of Hawaii, Honolulu, HI 96822)
Journal of Milk and Food Technology 36, No. 4, 214-219 (Apr. 1973)

The nutritional, physiological, and morphological characteristics of eighty-six strains of bacteria that had been isolated from cases of gastroenteritis and that had the general properties of the genus Beneckea were examined. These strains, which included the type strain of Beneckea parahaemolytica, were phenotypically homogeneous and distinguishable from the other known species of Beneckea by multiple, unrelated, phenotypic traits. The authors also discuss the validity of some of the traits previously used to identify B. parahaemolytica and the possible difficulties encountered in the identification of this organism from marine sources. [17 figures, 3 tables, 19 references] FTP

0.5
(2.05)

RADIOIMMUNOASSAY FOR TYPE A TOXIN OF CLOSTRIDIUM BOTULINUM

Boroff, Daniel A., and Gregory Shu-Chen (Research Immunology Laboratory, Albert Einstein Medical Center, Philadelphia, PA 19141)
Applied Microbiology 25, No. 4, 545-549 (Apr. 1973)

Because C. botulinum toxin is extremely potent, an effective laboratory assay procedure for it must be rapid, specific, and sensitive; such properties are found in the radioimmunoassay of S. A. Berson and R. S. Yalow [Radioimmunoassay Hosp. Pract. 3, 73 (1968)]. The technique is based on the competition between radiolabeled and unlabeled antigen for binding to specific antibody. The ratio of bound to free labeled antigen is decreased as the concentration of the unlabeled antigen is increased. The level of toxin in the unknown sample is obtained by comparing the inhibition observed in the sample with that produced in standard solutions containing known amounts of the antigen. This radioimmunoassay must be carried out with preparations of high purity and high specific radioactivity. The purpose of the present study was to examine the possibility of radiolabeling the toxin of C. botulinum type A (because it is available in pure form) and using it in a radioimmunoassay.

Pure type A toxin of C. botulinum was labeled with ^{131}I in the presence of chloramine-T and carrier-free isotope. The oxidizing agent chloramine-T liberates free I which in turn substitutes into tyrosine residues of the protein. The radioactive toxin was used in a radioimmunoassay procedure similar to that of Berson and Yalow. Dilutions of antibody to the toxin, capable of binding 50% of the added

0.5
(2.05)

VIBRIO PARAHAEMOLYTICUS--ISOLATION, IDENTIFICATION, CLASSIFICATION, AND ECOLOGY

Colwell, R. R., T. E. Lovelace, L. Wan, T. Kaneko, T. Staley, P. K. Chen, and H. Tubiash (Dept. of Biology, Georgetown University, Washington, DC 20007)
Journal of Milk and Food Techology 36, No. 4, 202-213 (Apr. 1973)

V. parahaemolyticus was isolated and identified from samples of water, sediment, blue crabs, oysters, and clams from several areas of Chesapeake Bay. The isolates implicated in recent outbreaks of food poisoning in the United States were shown (by use of DNA/DNA reassociation measurements) to be closely related to Japanese and other isolates collected in the United States. Distribution of V. parahaemolyticus seems to be in the coastal and estuarine regions. The organism is closely associated with the zooplankton in Chesapeake Bay; rhythmic cycles of occurrence in the water column parallel with the appearance of plankton blooms were demonstrated. [15 figures, 3 tables, 33 references] FTP

0.5 (2.05)

radioactive toxin, were mixed with a sample of the labeled toxin and various concentrations of the unlabeled toxin. When the level of unlabeled toxin was plotted against the ratio of (radioactive toxin bound)/(radioactive toxin not bound), a standard curve was obtained that could be used to estimate the concentrations of unlabeled toxin in a test mixture. The assay is sufficiently sensitive to detect as little as 100 mouse minimum lethal dose (or 0.1 ng.), and it is highly specific for the serological type of the toxin used.
[4 figures, 2 tables, 7 references] FTP

0.5 EFFECT OF FROZEN STORAGE TIME ON HEAT INACTIVATION
(3.33)(2.05) OF CLOSTRIDIUM BOTULINUM TYPE E TOXIN

Yao, Modesto G., Cleve B. Denny, and C. Wallace Bohrer (National Canners Association Research Foundation, Washington, DC 20036)
Applied Microbiology 25, No. 3, 503-505 (Mar. 1973)

When type E toxin of C. botulinum was stored in the frozen state (-15° C.), the toxin retained its original toxicity level but lost its stability to heat as the storage time increased (total storage time 264 days). Therefore, the maximum heat stability of type E C. botulinum toxin is with the freshest toxin, and heat-inactivation tests on the toxin should not be conducted with toxins stored frozen more than 1 week.
[1 figure, 1 table, 4 references] FTP

0.5
(7.86)(9.15) FISH VIRUSES: BUFFERS AND METHODS FOR PLAQUING EIGHT AGENTS UNDER NORMAL ATMOSPHERE

Wolf, Ken, and M. C. Quimby (Eastern Fish Disease Laboratory, Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Kearneysville, WV 25430)
Applied Microbiology 25, No. 4, 659-664 (Apr. 1973)

The purpose of this study was to develop a plaque assay for eight fish viruses [bluegill myxovirus, channel catfish virus, eel virus, Egtved virus, infectious hematopoietic necrosis virus, infectious pancreatic necrosis virus, lymphocystis virus, and the agent of spring viremia of carp (Rhabdovirus carpio)], in dish cultures of various fish cells. This paper describes such a procedure, including the medium, which supports both cell growth and viral replication in normal atmosphere of the eight fish viruses.
[1 figure, 6 tables, 14 references] FTP

0.5

The starter cultures inhibited growth of S. aureus (initial inoculation of 30,000 and 190,000 bacteria per gram) greater than 99% (as compared to growth of the organism in the control sample that did not contain added starter or acidulant) after 50 hr. of incubation at 37° C., inhibited S. aureus at 30,000/g. greater than 99% at 30° C., and greater than 97% at 21° C. The test samples containing added chemical acidulants only (0.75% GDL plus 0.1% citric acid) showed good initial control of S. aureus but extensive growth of the organism occurred by 50 hr. of incubation. Test samples containing added starter culture and chemical acidulants gave about 99.99% inhibition of S. aureus (percent inhibition compared to inoculated control sample).

The authors conclude that properly selected, physiologically active starter cultures will not only improve the uniformity of certain sausage products and shorten production cycles, but will also ensure the safety of the meat product. Commercially available cultures, too, are convenient to use and do not require special handling procedures.
[7 tables, 23 references] FTP

0.5
(6.54) EFFECTS OF SYNTHETIC MEAT COMPONENTS ON GROWTH OF CLOSTRIDIUM PERFRINGENS

Schroder, D. J., and F. F. Busta (Dept. of Food Science and Nutrition, University of Minnesota, St. Paul, MN 55101)
Journal of Milk and Food Technology 36, No. 4, 189-193 (Apr. 1973)

Earlier work showed that components added to soy protein base in fabricating synthetic soybeef stimulate the growth of C. perfringens. The purpose of the present study was to determine which of the components in soybeef (when added to soy protein) have the major influence on the growth rate of the organism. The 16 ingredients were added to the soy protein base in a formulation similar to that in the commercial product. These ingredients consisted of vegetable oil, beeflike flavor, egg white, corn flour, sugar, caramel, cocoa, onion powder, sodium chloride, calcium phosphate, ferric pyrophosphate, sodium lauryl sulfate, niacin, riboflavin, vitamin B_6, and vitamin B_{12}. The effects of individual ingredients on the growth of C. perfringens was evaluated by use of a screening fractional factorial design (O. L. Davies, The Design and Analysis of Industrial Experiments, Ed. 2, Hafner Publishing Co., New York, N.Y. (1967)].

Four of the 16 ingredients stimulated the growth of C. perfringens: beeflike flavor, corn flour, cocoa, and vegetable oil. The rest of the ingredients showed no effect. The authors state that these results indicate the potential importance of a few key ingredients of a fabricated food in influencing the growth rate of a potentially pathogenic organism.
[2 figures, 5 tables, 10 references] FTP

0.6 (6.195) ESSENTIAL AMINO ACID LEVELS FOR STARTING TURKEY POULTS

Warnick, Robert E., and Jay O. Anderson (Utah State University, Logan, UT 84321)
Poultry Science 52, No. 2, 445-452 (Mar. 1973)

The purpose of this work was to determine what levels of essential amino acids are needed to make a well-balanced ration for turkey poults. Semipurified diets were fed to Broad Breasted Bronze turkey poults; the protein portion of the diets consisted of herring meal, soybean meal, wheat gluten, gelatin, and crystalline amino acids. The protein level of the diets was 28% (nitrogen x 6.25) and the metabolizable energy of the diets was 3,050 kcal./g. The estimated minimum requirements of essential amino acids are (expressed as percentage of the diet): arginine, 1.60; histidine, 0.58; lysine, 1.68; leucine, 1.86; isoleucine, 1.10; valine, 1.20; phenylalanine and tyrosine, 1.80; tryptophan, 0.26; methionine and cystine, 1.04; and threonine, 1.00.
[1 figure, 5 tables, 6 references] FTP

0.7 (0.4)(9.19) MERCURY LEVELS IN THE BLOOD AND HAIR OF INDIVIDUALS EATING METHYLMERCURY-CONTAMINATED FISH

Anonymous
Nutrition Reviews 31, No. 2, 53-55 (Feb. 1973)

The two major sources of recent human intoxication with mercury have been the consumption of seed grain treated with organic mercury fungicides and, in Japan, the consumption of fish and shellfish from aquatic environments contaminated with mercury from certain industrial operations. The primary form of mercury in the fish and shellfish which were the principal factors in the cases of poisoning in Japan (Minamata disease) was methylmercury.

Recently, G. Birke, A. G. Johnek, L. Plantin, B. Sjöstronel, S. Skerfving, and T. Westermark [Arch. Environ. Health 25, 77 (1972)] have reported on a controlled study of the levels of mercury in the blood and hair of individuals consuming fish containing various concentrations of methylmercury. Two groups of subjects were studied. One group, referred to as the "normal" group, was made up of those consuming diets containing no, low, or moderate intakes of fish originating mainly from the ocean. Ocean fish are considered to contain "normal" levels (0.01 to 0.1 mg. per kilogram) of mercury, that is, mercury accumulated largely from natural sources rather than from that introduced into the aquatic environment by industrial or agricultural uses.

Total mercury and methylmercury in the blood and hair of subjects having a low, moderate, or high intake of fresh-water fish contaminated with methylmercury were

0.7 (9.19) THE COMPARATIVE EFFECT OF ORAL INGESTION OF METHYL MERCURY ON CHICKS AND RATS

Soares, J. H., Jr., David Miller, H. Lagally, B. R. Stillings, P. Bauersfeld, and S. Cuppett (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, College Park, MD 20740)
Poultry Science 52, No. 2, 452-458 (Mar. 1973)

The purpose of this study was to find out (1) whether the low levels (0.3 to 0.4 p.p.m.) of mercury found in some fish meals were hazardous to broiler chickens, (2) the effects of various levels of methyl mercury ingested by broilers over a period of from 4 to 7 weeks, and (3) the effects of the same levels of methyl mercury on rats over a period of 12 weeks. In the first experiment with chicks, three diets were fed. The first two were semipurified diets in which the sole source of protein was soybean meal or fish meal, with the protein level of the diet at 12%. The third diet was a corn-soybean ration supplemented with 5% fish meal and 5% meat and poultry meal; it contained 23% protein, representing a practical feeding regime. In the second experiment, the chicks were fed diets containing 0, 0.50, 1.02, 2.19, 5.09, 7.80, or 16.88 p.p.m. mercury (as methyl mercuric chloride), with soybean meal as the sole source of protein and with added methionine. Weanling white rats were fed four of these same diets containing added methyl mercuric chloride (0.05, 0.99, 2.85, and 16.00 p.p.m. of mercury).

Feeding the chicks fish meal containing higher than normal levels of mercury did not result in the concentration of mercury in the poultry tissues that exceeded FDA guideline levels. The level of mercury in the chicken breast muscle averaged

0.7 THE VALUE OF SELENIUM IN ANIMAL FEEDING

Cunha, T. J. (Dept. of Animal Science, University of Florida, Gainesville, Fla.)
Feedstuffs 45, No. 21, 48, 62 (May 21, 1973)

The role of selenium in animal feeding and nutrition has been discovered only in the last 5 to 10 years. This element was found to be essential in the diets for swine, chickens, turkeys, cattle, horses, sheep, and other animals. Many cases of selenium deficiency in livestock have occurred under practical feeding conditions. The author concluded that selenium supplemented feeds are needed for all classes of farm animals. The Food and Drug Administration proposed the use of the element for swine and poultry feed on April 28, 1973. Vitamin E and selenium are needed by animals; in some cases, vitamin E will substitute for selenium in varying degree, and selenium can be substituted for vitamin E. However, other cases will respond only to one or the other. Selenium has been found to reduce the amount of vitamin E required in an animal and to reduce the onset of symptoms of a deficiency. The sulfur containing amino acids (such as methionine) also protect against diseases associated with low intake of selenium and vitamin E. Vitamin E and selenium deficiencies are being encountered more frequently in the United States and other parts of the world. The author offered the following explanations for these deficiencies: selenium deficient areas are now being recognized throughout the world as more analyses of feed are conducted and more sensitive analytical methods are available for detecting very low levels of selenium; vitamin E-deficient diets are occurring that will increase the need for selenium under certain conditions; it is possible that certain strains or breeds of livestock require more selenium than

0.7 (0.4)(9.19)

also examined. Clinical evaluation of the state of health in exposed individuals was also investigated.

The results of the study by Birke et al. indicate that a predictable relationship does exist between exposure to methylmercury by ingestion of fish and blood mercury levels. A correlation between blood mercury levels and levels in hair also was seen.

What is not known with any certainty is the level of mercury in the blood and hair which corresponds to the onset of clinically detectable symptoms of mercury intoxication. [10 references]

Quoted in part; slightly modified to include the reference.

0.7

others; animals crossbred for increased growth and productivity also have increased nutrient needs including selenium; and analyses of feeds for selenium can be misleading. Many diets thought to be adequate may be deficient because the form of selenium may be low in availability. Vitamin E deficiencies are also appearing; the author suggests that the heating and other treatments given feeds is destroying the vitamin. The author described the effects of the deficiencies in swine, horses, chickens, turkeys, and ruminants. He suggests that the safest way to supply selenium is to add it to salt. Concentrations of selenium in muscle tissue of meat animals that might be toxic to humans have not been found, though the animals were exposed to toxic levels of dietary selenium.
[1 table]

SW

0.7 EFFECT OF FEEDING DIFFERENT PROTEIN LEVELS AND OF CHANGING PROTEIN LEVEL ON EGG PRODUCTION

Fernandez, Raul, Adel J. Salman, and James McGinnis (Dept. of Animal Sciences, Washington State University, Pullman, WA 99163)
Poultry Science 52, No. 1, 64-69 (Jan. 1973)

A diet containing 13% protein and supplemented with lysine and methionine was as effective as diets containing 15%, 17%, or 18% protein for supporting egg production and egg size of hens.
[9 tables, 17 references]

FTP

0.7 (9.19)

0.1 p.p.m. when the fish meal made up 17% of the diet. However, significant amounts of mercury were deposited in the test birds: 0.13 p.p.m. mercury in the feathers of the chickens fed the soybean diet; 0.44 p.p.m., in the feathers of the chickens fed the fish meal diet; and 0.33 p.p.m. in the feathers of the chickens fed the practical diet.

The chickens fed the diet containing 16.88 p.p.m. mercury succumbed to mercury toxicity by 17 days of age (the total mercury dose was 28.3 mg./kg. body weight). Within limits the levels of mercury in the tissues of the chickens were proportional to the dietary levels. After 7 weeks of exposure to the diets containing added mercury, the chicks retained an average of 63% of the mercury consumed. During a 21-day depletion period, the chickens excreted an average of 0.66% of the total body burden of mercury per day.

Rats fed 16.00 p.p.m. of mercury initially showed outward signs of toxicity at the sixth week of treatment. In general, the rats tolerated the highest level of dietary methyl mercuric chloride for a longer period of time than did the chicks. None of the rats fed the lower levels of mercury showed symptoms of toxicity.
[9 tables, 16 references]

FTP

0.7 MERCURY TOXICITY REDUCED BY SELENIUM

Anonymous
Nutrition Reviews 31, No. 1, 25-27 (Jan. 1973)

A methylmercury compound added to a tuna-corn-soya ration fed to Japanese quail was less toxic than an equivalent amount of the compound added to the basal corn-soya ration. Selenium present in the tuna is apparently the factor that reduces mercury toxicity, since it was also reduced or prevented by addition of selenium to the diets. These observations also suggest that mercury in tuna may be somewhat less dangerous for man than has been thought, and that total mercury in the diet or in the blood may not be a valid criteria, in the presence of modifying factors. Abstract and part of text quoted.

1.31 (1.0113) FACTORS AFFECTING THE ABUNDANCE OF FALL CHINOOK SALMON IN THE COLUMBIA RIVER

Van Hyning, Jack M. (University of Alaska, Fairbanks, Alaska)
Research Reports of the Fish Commission of Oregon 4, No. 1, 1-87 (Mar. 1973) Free. Obtainable from the Fish Commission of Oregon, Division of Management and Research, 17330 S.E. Evelyn St., Clackamas, OR 97015.

The fall run of chinook salmon in the Columbia River supported a fishery that maintained a production of 10 million pounds annually for many years. In 1949 a sharp decline began, leveled off, and stabilized through the 1950's at 2 to 3 million pounds annually. This report is an analysis of information on the chinook salmon covering the years 1938 to 1959 to determine the possible causes of the decline. Since 1959, further profound environmental changes have occurred in the Columbia and Snake Rivers which this report does not cover.

Highlights gathered from the analysis were: maturity and survival patterns changed at about 1950; a negative correlation was found between the ocean temperature during the first year at sea and survival; a large increase in ocean fishing coincided with the decline in the run; high exploitation in the ocean fisheries was found; the contribution of Columbia River chinook to the ocean fisheries was probably greatly underestimated; an inverse correlation between estimated ocean catch and fish entering the river was found for the postdecline period; the gill net fishery was destructive; optimum escapement between 90,000 and 100,000 adults was exceeded in most years; most of the early dams on the Columbia had no direct effect and the decline in production occurred when river conditions were stable;

1.013 (1.21)(6.10) THE ANCHOVY CRISIS

Idyll, C. P.
Scientific American 228, No. 6, 22-29 (June 1973)

The 1,475-mile Peruvian coastline is kept normally cool by the ocean current which can be as low as 10° C. (50° F.). This current is called the Peru Current and consists of four subcurrents. Two of these travel northward: The Coastal Current, flowing next to the shore; and the Oceanic Current, flowing farther out from the coast. Between them, on and near the surface, runs the Peru Countercurrent. Beneath the three currents runs the Peru Undercurrent. The countercurrent and the undercurrent flow southward. The Coastal Current runs deep and close to the shore; it is about 2,000 miles long, running from Valparaiso, Chile, to Chimbote, Peru. The anchovies live in the northern part of the Coastal Current. The Oceanic Current, longer than the Coastal, can be several hundred miles wide and 700 meters deep. The Oceanic Current is also called the Humboldt Current after the German naturalist who visited the area in 1803. The north flowing currents are generated by trade winds blowing from the south and southeast. As the resulting offshore drift moves the surface water northward, the cold subsurface upwelling water replaces it, bringing rich nutrients that have accumulated in the deeper layers. These nutrients sustain the vast phytoplankton pasture of the sea which provides the fodder for minute crustaceans. This food supply is the basis for the anchovy crop that has been harvested heavily in the Peruvian fishery. Because the egg of the anchovy has a negligible store of yolk, the larva, with limited swimming power, must locate food quickly. The abundance of phytoplankton provides the energy source for the larvae, and is thus significant in the abundance of anchovy.

1.89 TEMPORAL AND SPATIAL DISTRIBUTION OF ACANTHASTER PLANCI POPULATION EXPLOSIONS IN THE INDO-WEST PACIFIC REGION

Endean, Robert (Dept. of Zoology, University of Queensland, St. Lucia, Brisbane, Australia), and Richard H. Chesher (Marine Research Foundation, Key West, Fla.)
Biological Conservation 5, No. 2, 87-95 (Apr. 1973)

Since 1931 there have been conflicting reports regarding the population density of the starfish coral predator A. planci. The authors believe that unprecedented population explosions have occurred on the coral reefs since 1957. In table form they have listed reports of observations and counts of the starfish. From the Gulf of Aqaba, past Ceylon, through Malasia, on to the Great Barrier Reef, and off the coasts of the World War II island battle zones northward to Taiwan are the locations listed. Abundance of the starfish has been listed in the range from "none seen" through "large numbers" to "infestation." No report is dated earlier than 1964 in the table. The authors suggest that in some regions the area of affected reefs has progressively increased. The major infestations have occurred on accessible reefs near centers of human population, while remote reefs are free from infestations. The authors conclude that human involvement has some relation to the increase in the starfish population; however, they concede that areas near human population centers would be observed more frequently than remote areas would. [1 table, 25 references] SW

1.013 (1.21)(6.10)

Occurring at irregular intervals, a complicated series of phenomena, known as El Niño, can disturb this environmental system. This disturbance may be repeated annually for 2 or more years or may not recur for 10 years or longer. The disturbance usually begins about Christmas time and has been given the Spanish name for the Christ Child, El Niño. In El Niño conditions, the steady wind from the southeast shifts to the west, the temperature of the coastal water rises, and the salinity decreases. A slowing of the north flowing Coastal Current occurs, accompanied by a decline in the upwelling waters bearing nutrients for the phytoplankton. The scarcity of food combined with the increased temperature and decreased salinity of the water causes the anchovies to scatter. From the tight masses of fish that a purse seine could harvest 100 tons at a time, the anchovy aggregations decline to poor targets for fishermen.

The anchovy fishery made Peru the world's leading fish-producing nation. The anchovy industry began in 1957 and harvests increased since then until they were 10 million metric tons or more per year. The fish meal made from the Peruvian catch was sold worldwide to enrich livestock feeds; the fish oil went into foods, cosmetics, and industrial products. The exports brought Peru $340 million; and the industry was a major element in the economy. Beginning with a sudden decline in the early part of the year, the anchovy catch for the 1972 season declined to only 4.5 million tons. The latest El Niño is considered to be the most severe, but biologists are not blaming the anchovy decline on El Niño alone. They also believe that there are changes in the anchovy population which indicate that severe overfishing has occurred. A reduction in the number of spawners combined with physical changes in the environment may result in the inability of the anchovy population to recover to its original numbers when conditions return to normal. [4 photographs, 2 maps, 2 graphs] SW

1.89 CEPHALOPOD RESOURCES OF THE WORLD
(1.01)

Voss, Gilbert L. (School of Marine and Atmospheric Science, University of Miami, Coral Gables, FL 33124)

FAO Fisheries Circular No. 149, Food and Agriculture Organization of the United Nations, Rome, Italy (Apr. 1973), 75 pp. (Distribution restricted)

The groups of cephalopods considered in this report are: cuttlefish (Sepia, Sepiella) and bottle-tail squid (Rossia, Sepiola, and others); squid (oegopsids such as Ommastrephes and Illex and myopsids such as Loligo and Sepioteuthis); and octopus (Octopus, Cistopus, and Eledone). Information, on a worldwide basis, is provided on catch and landings, species of economic importance, biology of the species, methods of capture, and an estimate of the potential cephalopod resources of the world oceans.

The staff of FAO is preparing a comprehensive review of the world's marine resources as part of the Perspective Study of World Agricultural Development (formerly called the Indicative World Plan for Agricultural Development). As part of the study, the review "The Fish Resources of the Ocean," compiled and edited by J. A. Gulland, has already been published [Fishing News (Books) Ltd., England]. The present study is intended to supplement the overall review; it has been issued in a provisional version as an FAO Fisheries Circular to be issued later in another series.

[9 figures, 26 tables, 209 references] FTP

0.8 WASTE WATER TREATMENT IN COMMERCIAL FISH PROCESSING:
(2.3)(9.19) REDUCING STICK WATER LOADINGS

Stuiber, David A. (University of Wisconsin, Food Science), and John T. Quigley (University of Wisconsin-Extension, Engineering)

Sea Grant Advisory Report No. 1, University of Wisconsin, Madison, Wis. (Nov. 1972), 17 pp. Price not given. Available from the Sea Grant Publications Office, 1225 W. Dayton St., Madison, WI 53706.

This paper describes briefly a two-stage combination anaerobic-aerobic waste water treatment system for a fish (fresh water) meal plant.

[5 figures, 3 tables, 4 references] FTP

1.31 (1.0113)

temperatures of the river were not a serious factor; and river conditions at the time of migration were slightly related to return of adults.

Variables that appeared to relate to abundance were further analyzed. For the predecline period, ocean temperature and ocean troll fishing were significant. For postdecline years, troll effort had the most influence on total returns, with ocean temperature and escapement having lesser effects. Due to unique features in their life history, Columbia River fall chinook salmon are exposed to much more ocean fishing than other populations; thus, other runs did not show similar declines. The author concluded that increased ocean fishing was the main factor in the decline of the Columbia River fall chinook run. This conclusion was confirmed by correlation, by analogy, and by the process of elimination.

[21 figures, 14 tables, 99 references] SW

2.1121 THE SMALLER FISHING BOAT. ONE BOAT -- FOUR TRAWLS

Noel, H. S. (World Fishing, Riverside House, Hough Street, London, SE 18 6LR, England)
World Fishing 22, No. 4, 34, 36 (Apr. 1973)

Gulf of Mexico shrimp trawlers are working four trawls together instead of the usual two. A boom on either side of the vessels supports two trawls each. The advantages of the multiple trawl are: better maneuverability, smaller doors (therefore less power), continuous fishing by alternate hauling, and an increased catch--by as much as 25%. A neutral door or sled towed between the two trawls acts as an inner door for each, and the outer edge of each trawl has a conventional otter door. [2 diagrams, 1 photograph] SW

2.118 FREEZING AT SEA ON WEST COAST TROLLERS. PART 1

Roach, Stewart W. (Technological Research Laboratory, Fisheries Research Board, Environment Canada)
Published by the Centre for Continuing Education, University of British Columbia, Vancouver 8, British Columbia, Canada (n.d.), 13 pp.

To maintain the best quality, fish should be 'quick' frozen. This term has been defined in Britain as follows: The whole fish is cooled through the range of 32° to 23° F. in less than 2 hr. and it is then kept in the freezer until the thickest part reaches 20° F. or lower. The factors which most affect rate of freezing are fish thickness, temperature of the cooling medium, and the efficiency of heat transfer between the fish and the cooling medium. For a given temperature difference between the fish and a cooling medium, the rate of heat transfer is lowest using air because it has a low capacity for picking up heat. Higher rates of heat transfer occur in contact freezing, and even more rapid cooling takes place when the fish is immersed in a freezing liquid such as brine.

There are three different methods in use by various British Columbia West Coast trollers for freezing fish at sea:

1. Shelf Freezing.--In this method the fish are frozen partly through contact with a cold shelf but mainly by circulation of cold air in the freezer section. The hold is refrigerated in a similar manner. A single refrigeration unit maintains the required temperatures for freezer section and hold.

2. Air Blast Freezing.--In this method a refrigerated blower unit is used to freeze the fish and refrigerate the hold. The fish are placed in racks in front of the blower unit for freezing.

2.15 (1.51) THE CONNECTIVE TISSUES OF FISH. VII. POST-MORTEM HYDRATION AND ICE CRYSTAL FORMATION IN MYOCOMMATA, AND THEIR INFLUENCE ON GAPING

Love, R. M., and J. Lavéty (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 7, No. 4, 431-441 (Dec. 1972)

Other reports indicated that when chilled, gutted fish are frozen at different lengths of time after death, the amount of gaping that appears in the flesh after thawing and filleting increases in a characteristic way. Gaping was found least in iced fish that were frozen before the onset of rigor mortis. There is a rapid increase in gaping if rigor mortis sets in when the fish are in the process of being frozen. This increase in gaping is presumed to be due to the tension developed by the muscle as rigor mortis sets in. If the unfrozen fish are held for longer periods in melting ice, the rigor mortis that occurred in the muscle gradually ceases so that the body becomes more flexible. After freezing, thawing, and filleting of these fish following rigor mortis, less gaping would be expected than fish frozen at the height of rigor. Experiments on six species of fish showed that following resolution of rigor mortis the gaping continues to increase with time in ice before freezing. An investigation into the gaping that occurs under these conditions indicated that the water content of myocommata increased after the death of the fish. [Myocommata are membranous partitions between muscle segments. Abstractor's note]

Ice crystal formation upon subsequent freezing will be more disruptive under these conditions than when the myocommata are not so hydrated. Rigor mortis in

2.3 FISH SKINNING

Ammerman, G. R.; Mississippi State University Development Foundation, Inc. (pat.)
U.S. Patent 3,706,333
Food Technology 27, No. 6, 98 (June 1973)

Frozen dressed catfish are immersed in a hot caustic bath for 1-3 min., rinsed, and then placed in a neutralizing acid (acetic or citric) bath, and again rinsed to remove the skin. The fish are refrozen after deskinning. FTP

2.3 FORMING OF FISH MEAT

Langlands, I. H.; National Sea Products Ltd. (pat.)
Canadian Patent 919,495
Food Technology 27, No. 6, 98 (June 1973)

The equipment is used to produce predetermined-shape portions of fish. FTP

2.118

3. Air Blast With Semijacket.--This variation of airblast freezing discharges cold air through the fishhold; the air returns to the heat exchanger through ducts located between the insulation and the linings of the sides and floor of the hold.

The use of a single refrigeration unit for freezing fish in air is simple and relatively inexpensive, but the method has serious faults--one being insufficient refrigeration capacity. On many salmon trollers truck-type blower units are used which have a nominal rating of 1,500 lb. per day freezing capacity. If these systems are overloaded, some of the fish may be partially frozen and deteriorate in quality. Poor quality fish become tough and rancid; these undesirable characteristics occur more rapidly at temperatures just below 32° F. than at lower temperatures. Freezer methods which ensure rapid freezing to temperatures well below 32° F. will prevent this deterioration. The methods now in use on the trollers should be modified to obtain more efficient freezing. One of the most important changes would be the addition of forced air circulation. However, increase in the capacity of the refrigerator unit will be necessary. SW

2.114 POWER IS NOT EVERYTHING

Thew, C. (Kort Propulsion Co., Ltd., London, England)
Commercial Fishing 12, No. 4, 6-11 (Apr. 1973)

This article discusses ways and means of improving bollard pull without increasing engine horsepower. The horsepower output of an engine is not the only criterion to be considered in specifying the propulsion system components of a fishing boat. The overriding problem to be solved in selecting components for a propulsion system is how efficiently the engine power will be converted to useful thrust required to overcome trawl resistance. The use of a nozzle to house the propeller increases thrust and gives other advantages. The advantages of increased thrust can be used to: trawl larger gear, trawl at a faster rate, save fuel costs, reduce maintenance, increase carrying capacity by reducing fuel required, extend time at sea, and increase acceleration. The author gives a list of vessels that have been converted from open propeller to nozzle-type propulsion. Examples of increased bollard pull are as follows: the vessels Boston Argosy and Boston Provost had an initial pull of 5.15 tons; after conversion, the pull increased to 7.5 tons. The engine of 515 b.hp. was not altered.
[2 photographs, 4 diagrams, 6 tables, 6 references] SW

2.1121 DESIGN OF TRAWLS. PART 7

Buckingham, Harry
World Fishing 22, No. 4, 40, 42 (Apr. 1973)

The author closes his series of articles on nets and trawls with considerations to be applied in their design. Such details as horsepower of the towing vessel, the ground over which it will work, and the type of fish to be caught should be used in the trawl design. Examples of mesh calculations, information on dimensions to rig a taut net, and the type of selvage ropes to be used are given. In addition, the author describes the best multiple eye splices, toggles and footropes, and bobbins and floats to be used.
[2 diagrams] SW

2.15 (1.51)

muscle tissue causes shrinkage of the muscle cells with exudation of fluid. Radioactive tracer studies showed that this exudate plus water from melting ice in which the fish are packed are the sources of ice formed upon freezing the fish. By wrapping the fish before icing, the melt water is excluded from the fish muscle; fish frozen after this treatment were found to have less gaping.
[2 figures, 2 plates, 1 table, 17 references] SW

2.3 MACHINE FOR EXTRACTING MEAT FROM CRAB SECTIONS

Craig, Warren J. (Ellicott City, Md.) (pat.)
U.S. Patent 3,719,967 (Mar. 13, 1973)

The machine is used to extract the meat from the body sections of crab. FTP

3.11 (0.5) FUNCTION OF LIPOPHILIC ACIDS AS ANTIMICROBIAL FOOD ADDITIVES

Freese, Ernst, Chingju W. Sheu, and Enid Galliers (Laboratory of Molecular Biology, National Institute of Neurological Diseases and Stroke, National Institutes of Health, Bethesda, MD 20014)
Nature 241, No. 5388, 321-325 (Feb. 2, 1973)

Most food preservatives are lipophilic acids which inhibit the growth of unwanted microorganisms, usually without killing them. Although they are ingested in significant amounts, they do not seem to interfere with human organ function (as judged by toxicity tests). Up to now the inhibitory mechanism of these preservatives was not known, but in this report the authors indicate that the preservatives prevent microbial growth by inhibiting the transport of substrate molecules into cells.
[6 figures, 3 tables, 19 references] SW

3.63 (1.83) STUDIES ON THE PROCESSING OF ABALONE. V. DRIED ABALONE: TECHNIQUES AND CHARACTERISTICS OF DRYING

Doe, P. E. (Dept. of Mechanical Engineering, University of Tasmania), D. G. James, and Farley Young (CSIRO, Division of Food Research, Tasmanian Regional Laboratory, Hobart, Australia)
Food Technology in Australia 25, No. 4, 189, 191-192, 195 (Apr. 1973)

Whole, dried abalone of commercially acceptable quality were produced by hot air drying in a recirculating wind tunnel. From 6 to 18 abalone were supported across the working section of the wind tunnel on fiberglass gauze screens. The wind tunnel was open ended; the working section was 0.6 m. wide, 0.3 m. high, and 2 m. long. Studies indicated that abalone should be pretreated, before drying, by holding them overnight in 10% salt solution. After brining, they should be placed in water which is then brought to the boiling point over a 15-min. period and held in boiling water for 5 min. to ensure that they are adequately cooked. Rapid boiling is undesirable because it causes splits in the surface of the meat. Pretreated abalone were suitably dried in the wind tunnel with air temperatures in the 30° to 40° C. range at air velocities of 1.5 to 2.0 m. per second. Temperature, velocity, and humidity can be varied; however, if drying is to be performed slowly at low temperature, humidity should be such that water activity is low to prevent external bacterial damage. If drying is rapid at a high temperature, there is danger that the surface of the abalone will dry to a hard skin which will act as a barrier to prevent further drying in the interior of the meat; rapid drying can be prevented by increasing the humidity of the air.

3.2345 DIFFERENTIAL THERMAL ANALYSIS OF FROZEN FOOD SYSTEMS. II. MICRO-SCALE STUDIES ON EGG WHITE, COD AND CELERY

Parducci, L. G., and R. B. Duckworth (Research and Development Division, H. J. Heinz Co., Ltd., Hayes Park, Hayes, Middlesex, United Kingdom)
Journal of Food Technology 7, No. 4, 423-430 (Dec. 1972)

In the previous paper in the series [R. B. Duckworth, J. Fd. Technol. 6, 317 (1971)], a method was described for determining the quantity of unfreezable water in foods. In addition, the author suggested that such water is incapable of being converted to normal ice however lower the temperature is dropped. The use of lower temperatures revealed an irregular pattern of thermal behavior of each test material. In this paper (part II) the authors report that the influence of moisture content on irregular thermal behavior is related to the freezability of water in foods.

Samples of denatured egg white, powdered celery, and powdered cod were prepared and water content was determined. For differential thermal analysis (DTA), samples were quench cooled to -180° C. and set to warm at a rate of 20° C. per minute with a thermogram being recorded. Differential scanning calorimetry (DSC) was performed on samples in a similar manner.

The results indicated that heat denaturation of egg white reduced the proportion of water which is bound against freezing by about 14.5%. Egg white that had been subjected to aqueous extraction to remove water solubles exhibited a rise in the temperature at which the thawing peak appears for any specific level of hydration. Warming curves generated by DSC were similar to those generated by the DTA procedure. In the warming curve of samples containing relatively little water, the

4.14 SPERM WHALE OIL ANALYSIS BY GAS CHROMATOGRAPHY AND MASS SPECTROMETRY

Spencer, G. F.; and W. H. Tallent (Northern Regional Research Laboratory, ARS, U.S. Dept. of Agriculture, Peoria, IL 61604)
Journal of the American Oil Chemists' Society 50, No. 6, 202-206 (June 1973)

Following termination by law of U.S. trade in products from the sperm whale, research studies have been underway to develop substitutes for the valuable oil of this species. Winterized sperm whale oil was used in the lubricant industry; it was derived from a composite of head and blubber oils by a process that removed the more saturated components of both lipid fractions. This study was intended to obtain a detailed analysis of commercial winterized sperm whale oil before it disappeared from the market.

The wax esters with even carbon numbers of winterized sperm whale oil ranged from C_{24} to C_{42} and were present in quantities representing a normal distribution curve with C_{34} as the mean. Traces of odd chain lengths were also present. The levels of triglycerides also showed a normal distribution pattern and ranged from C_{42} to C_{58}; they included traces of odd chain species. Saturated and unsaturated, branched chain and odd chain constituents of alcohols and acids were found.
[1 figure, 5 tables, 27 references] FTP

3.2345

thawing peak did not appear. Other thermal irregulatities occurred in samples containing no freezable water; there was no thawing peak as expected, but there was an upward direction in the curves at progressively lower temperatures from samples containing progressively larger proportions of water. In the next paper, a fuller explanation of the meaning of irregular thermal behavior will be given.
[2 figures, 1 table, 19 references] SW

3.2493 FROZEN STORAGE OF FISH. IX. FREEZING OF COD FILLETS
(1.51)

Tamoto, Kaoru, Takatoshi Hidesato, and Kenji Kida (Hokkaido Fish. Exp. Stn., Yoichi, Japan)
Chemical Abstracts 77, No. 25, 163161g (Dec. 18, 1972)

3.4 SMOKING PROCESS

Baker, H. O., J. E. Hoff; Peter Eckrich & Sons, Inc. (pat.)
Canadian Patent 920,872
Food Technology 27, No. 6, 104 (June 1973)

The process is designed to remove carcinogens from natural hardwood smoke.
FTP

3.9 BIOCHEMICAL ASPECTS OF THE ENZYMIC RIPENING OF
(1.21) PRESERVED ANCHOVIES

Establlier, Rafael, and Manuel Gutierrez (Inst. Invest. Pesq., Puerto Pesquero, Spain
Chemical Abstracts 78, No. 9, 56627n (Mar. 5, 1973)

4.6 ANTIOXIDANTS

Hinkley, D. F.; Merck & Co., Inc. (pat.)
U.S. Patent 3,718,482
Food Technology 27, No. 6, 104 (June 1973)

Isoascorbic acid phosphates are used to enhance the antioxidant properties of foodstuffs. FTP

3.63 (1.83)

In the beginning of the drying process, the abalone dry at a constant rate; speed of drying is determined by the velocity and humidity of the air and by the shape of the meat. This phase of the drying is followed by the second phase in which the meat dries at a falling rate. The speed of drying can be increased by raising air temperature; however, it should not be increased above 40° C. or darkening of the meat will occur.
[4 figures, 4 references] SW

3.7 CHANGE IN THE CONTENT OF AMINO ACIDS AND VOLATILE BASES IN FAT
(1.22) DURING PRODUCTION OF DRIP-DRIED AND SUN-DRIED PACIFIC HERRING

Bazilevich, V. I. (U.S.S.R.)
Chemical Abstracts 78, No. 7, 41753b (Feb. 19, 1973)

4.81 PROBLEMS DISCOURAGING USE OF FISH OIL IN AMERICAN-MANUFACTURED SHORTENING AND MARGARINE

Stansby, Maurice E. (Pioneer Research Unit, Northwest Fisheries Center, Seattle, WA 98112)
Journal of the American Oil Chemists' Society 50, No. 6, 220A, 222A, 224A-225A (June 1973)

In 1936, a peak of 40 million pounds of California sardine oil was used as a component of many margarines and shortenings of American manufacture. When commercial quantities of the California sardine (pilchard) no longer were available, fish oil dropped out of the market for edible use in the United States. During the interim years, various circumstances or problems discouraged use of fish oils in edible products in the United States. These problem areas involved satisfaction of sanitary requirements during production, possible flavor reversion, restrictive legal aspects, uniformity of quality, trace mineral content, public aversion to nonvegetable oil sources, and price. Satisfaction of legal and sanitation requirements probably could be achieved by costly improvements in manufacturing facilities and processes. The limiting factor in the use of fish oil for edible purposes in the United States, then, would seem to be its cost.
[11 references]

FTP

6.190 (4.9) THE METABOLIZABLE ENERGY VALUES AND DIGESTIBILITIES OF MENHADEN FISH MEAL, FISH SOLUBLES, AND FISH OILS

Cuppett, S. L., and J. H. Soares, Jr. (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Poultry Science 51, No. 6, 2078-2083 (Nov. 1972)

Three energy balance experiments with chicks were used to determine the metabolizable energy (M.E.) content and the digestibility of the protein and the fat of fish meal, fish solubles, and fish oil. Ten menhaden fish meals, 10 menhaden fish solubles, and 6 menhaden fish oils were analyzed.

The menhaden fish meals had an average protein digestibility of 58.4% and a fat digestibility of 93.1%. The average M.E. value of the menhaden fish meals was 3.37 kcal./g. on a dry-matter basis (coefficient of variation was 5.6%), and 69.1% was metabolized.

Condensed fish (menhaden) solubles had an average protein digestibility of 57.1% and a fat digestibility of 88.7%. The M.E. value was 2.03 kcal./g. on an "as is" basis, and 70.4% of the energy in the fish solubles was metabolized. The coefficient of variation of the M.E. value was 10.8%. This relatively high variation is probably due to the low levels of solubles incorporated in the test diets.

The menhaden fish oils showed a fat digestibility of 90.6% and a M.E. value of 8.45 kcal./g. on the as is basis; the oils were 89.9% metabolized.
[9 tables, 17 references]

FTP

6.31 (9.16) EUCHEUMA FARMING FOR CARRAGEENANS

Doty, Maxwell S.
Sea Grant Advisory Report, UNIHI-SEAGRANT-AR-73-02, University of Hawaii, Honolulu, Hawaii (Apr. 1973), 21 pp. Price not given.

The different species of the seaweed genus Eucheuma produce one form or another of carrageenan. Carrageenan is a natural, complex carbohydrate product obtained by extracting seaweed with water. It is used as an emulsifier, stabilizer, and thickener in various foods such as ice cream, evaporated milk, puddings, and others. Most of the seaweed used in the production of carrageenan comes from Southeast Asia. This paper contains a description of the Philippine Eucheuma farming techniques and production areas.

The genus Eucheuma can be divided into two groups on the basis of the type of carrageenan produced; one group produces iota carrageenan (commercial name of "spinosum") and the other group produces kappa carrageenan ("cottonii"). About 3,000 to 4,000 tons of dry Eucheuma enter the world market, and most of it goes to the United States and some to the United Kingdom, France, and Denmark. The author indicates that the world price could be US$350 per ton if the product were clean, rewashed, dry, and monospecific (one species or the other). Some of the common carrageenan-containing species of Eucheuma used commercially are shown in the table that follows.

6.72 PURIFICATION OF A POTENT ANTITUMOR AGENT FROM A TAHITIAN SEA ANEMONE AND METHODS OF ADMINISTRATION STUDIES WITH EHRLICH ASCITES TUMOR IN MICE

Norton, T. R. (Dept. Pharmacol., Univ. Hawaii, Leahi Hosp., Honolulu, HI 96816), and M. Kashigawi
J. Pharm. Sci. 61, No. 11, 1814-1817 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 3, Abstract No. 3Q2921M, 191 (Mar. 1973)

An antitumor agent, stoichactin, resulted from aqueous alcoholic extraction of the sea anemone identified most probably as Stoichactis kenti. The alcoholic extract was purified by dialysis and gel permeation chromatography. The purified agent was found to control and cure Ehrlich ascites tumor in mice. Low dosages and different methods of administering the agent were found to be effective.

SW

6.195 ABOMASAL AND BLOOD PLASMA NITROGEN CONSTITUENTS OF WETHERS FED CORN GLUTEN AND FISH MEAL SUPPLEMENTED SEMIPURIFIED DIETS

Amos, H. E., G. E. Mitchell, Jr., C. O. Little, and D. G. Ely (Univ. Kentucky, Lexington, Ky.)
Chemical Abstracts 78, No. 7, 42014y (Feb. 19, 1973)

6.73 CHEMICAL COMPOSITION OF DIFFERENT VARIETIES OF AMBERGRIS

Korzh, L. N., and L. I. Strigina (Tikhookean, Nauchno-Issled. Inst. Rybn. Khoz., Okeanol., Vladivostok, U.S.S.R.)
Chemical Abstracts 78, No. 6, 33795b (Feb. 12, 1973)

6.9 PRODUCTION OF BREAD OF INCREASED FOOD VALUE

Shcherbatenko, V. V., A. F. Goryacheva, and I. P. Pashkin (U.S.S.R.)
Chemical Abstracts 78, No. 9, 56633m (Mar. 5, 1973)

6.195 LEVEL AND AVAILABILITY OF LYSINE IN SOME FEEDS AND ITS EFFECT ON THE GROWTH OF MEAT CHICKENS

Mantel, E. C. (Kuban S.-Kh. Inst., Krasnodar, U.S.S.R.)
Chemical Abstracts 78, No. 7, 41987f (Feb. 19, 1973)

5.2 SOME MINOR VOLATILE COMPONENTS FROM THERMALLY DEGRADED THIAMINE

Dwivedi, Basant K., and Roy G. Arnold (Dept. of Food Science & Technology, University of Nebraska, Lincoln, NE 68503), and Leonard M. Libbey (Dept. of Food Science & Technology, Oregon State University, Corvallis, OR 97331)
Journal of Food Science 38, No. 3, 450-452 (Mar.-Apr. 1973)

Thiamine is used as one of the ingredients for simulating meat flavor in foods. The effects of thermal degradation products of thiamine on the flavor are of interest.

The purpose of this study was to identify the volatile compounds resulting from the heat degradation of thiamine. Solutions of thiamine (10 mg. thiamine hydrochloride/ml.) were adjusted to pH 5.0, 6.0, 7.0, and 8.4. Fifty ml. samples of each of the thiamine solutions were autoclaved in sealed bottles for 1 hr. at 121° C. The cooled samples were extracted with diethyl ether, and the ether extract was dried. The residue was redissolved in 0.5 ml. diethyl ether. Volatile components of the ether extracts were analyzed by gas-liquid chromatography in conjunction with mass spectrometry. The following components were identified:

Compounds previously reported: 2-methyl thiophene, 4,5-dihydro-2-methyl thiophene, and 4-methyl-5-(β-hydroxyethyl) thiazole.

Additional compounds tentatively identified: 2-methyl sulfide-5-methyl furan, 4,5-dimethyl thiazole, 2-methyl-3-oxy-tetrahydrothiophene, and 2-acetyl tetrahydrothiophene.

[2 figures, 1 table, 20 references] FTP

6.31 (9.16)

Sources of kappa carrageenan ("cottonii" types)	Sources of iota carrageenan ("spinosum" types)
E. cottonii	E. spinosum
(E. okamurae)	(E. muricatum)
E. striatum	(E. denticulatum)
(E. nudum)	E. isiforme
(E. edule)	(E. acanthocladum)
E. procrusteanum	E. uncinatum
E. speciosum	(E. johnstonii)

The growth characteristics of the two general types are described. Also, the commercial harvesting of the seaweed crop is discussed, as are some experiments on the farming of Eucheuma species in the Philippines. The author believes that farming of Eucheuma, properly managed, could produce three times the dollar rate of return of that of sugar [cane?] production.

[7 figures, 6 tables, 8 references] FTP

7.42 OPTIMUM PROCEDURE FOR THE DETERMINATION OF SELENIUM IN BIOLOGICAL SPECIMENS USING ^{77m}SE NEUTRON ACTIVATION

Blotcky, A. J., L. J. Arsenault, and E. P. Rack (Medical Research, Veterans Administration Hospital, Omaha, NE 68105)
Analytical Chemistry 45, No. 7, 1056-1060 (June 1973)

Since trace quantities of selenium are important in the physiology of living species, various analytical procedures have been developed to determine microquantities of the element in serum and tissue. Some of the more frequently used procedures involve neutron activation analysis of the longer lived radioisotopes of selenium including ^{75}Se and ^{81}Se. A potentially useful isotope, ^{77m}Se has not often been used because of its short half-life (17.6±0.15 sec.) which restricts post irradiation chemistry of the biological sample. An advantage of using ^{77m}Se is that a large number of samples can be analyzed for Se and then additionally analyzed for protein, nitrogen, or other components if a nondestructive technique is used.

The authors studied procedures for the rapid, quantitative determination of trace amounts of Se (less than 0.06 µg.) in serum and tissue using ^{77m}Se neutron activation. In the optimum procedure, using a low-power nuclear reactor, lyophilized tissue samples or dialyzed-lyophilized serum samples were irradiated for 20 sec., with a 20-sec. decay time, before exposure to radioassay. The radioassay assembly that was used in the procedure was the 5 mm. × 3 in. NaI (TI) detector system. The spectral analyses and data reduction procedure consisted of

7.47 PRECISE SHIPBOARD DETERMINATION OF DISSOLVED NITROGEN, OXYGEN, ARGON, AND TOTAL INORGANIC CARBON BY GAS CHROMATOGRAPHY

Weiss, R. F., and H. Craig (Scripps Institution of Oceanography, University of California at San Diego, La Jolla, CA 92037)
Deep-Sea Research and Oceanographic Abstracts 20, No. 4, 291-303 (Apr. 1973)

This paper describes a chromatographic system for the rapid and precise determination of dissolved gases in sea water aboard the research vessel at sea. Separate instruments are used for total inorganic carbon, and for nitrogen, oxygen, and argon analyses.
[5 figures, 25 references] FTP

7.50 (9.19) PESTICIDE RESIDUES

Thornburg, Wayne (Del Monte Corporation Research Center, Walnut Creek, CA 94598)
Analytical Chemistry, Annual Reviews 45, No. 5, 151R-167R (Apr. 1973)

This review period (Nov. 1970 to Nov. 1972) was one in which existing techniques were improved and new instrumentation was developed. A dictionary of pesticides with indexes, reviews, bibliographies, and other collections of pesticide information were published in the period. A pesticide data retrieval system was programmed for a computer. Techniques of gas chromatography (GC) continue to be the procedure that best meets the requirements for separation and measurement of pesticide residues. Improvements in analysis are expected with combinations of GC, mass spectrometry, and the assistance of the computer. Other innovations, modifications, and improvements in GC procedures were reviewed. General procedures for the analysis of chlorinated pesticides and their metabolic products were reviewed. Biological samples preserved in formaldehyde or phenol solutions for subsequent analysis were found to be in better condition for gas-liquid chromatography (GLC)--because of less interference--than samples preserved by other fixatives. Procedures for analysis of specific organochlorine pesticides were listed. Methods for the determination of organophosphorus pesticides were reviewed. Flame photometry was found to be the most satisfactory procedure. Reports of analytical procedures for many specific organophosphorus compounds were reviewed. Analysis for carbamate insecticides is sometimes made difficult because of their instability in GLC columns.

7.86 (0.5)(6.55) FACTORS INFLUENCING DETECTION OF SALMONELLAE IN RENDERED ANIMAL BY-PRODUCTS

Tompkin, R. B., and T. V. Kueper (Swift & Company, Research and Development Center, Oak Brook, IL 60521)
Applied Microbiology 25, No. 4, 485-487 (Apr. 1973)

There is no single method that will satisfactorily recover all Salmonella serotypes from all types of foods. Thus, detection of salmonellae in contaminated food and feed ingredients may depend upon many factors. In this study the researchers examined the influence of bacteriological media on and the relationship of total count to the isolation of salmonellae. Such information should provide a better understanding of the factors that influence the detection of salmonellae in naturally contaminated animal byproducts.

Of one hundred and eighty-three animal byproduct samples, previously determined to be positive for Salmonella, 139 were found positive in tetrathionate-Brilliant Green-iodine broth (TB) and 148, in selenite-cystine broth (SCB). The combination of SCB and Salmonella-Shigella agar plates (SS) gave 127 positive samples; the combination of SCB and Brilliant Green-sulfa agar (BGS) gave 92 positive samples. Of 405 samples, the rate of isolations of salmonellae increased from 12.7% to 70.6% as the total plate count increased from less than 10^4/g. to 10^7/g. There appears to be a linear relationship between detection of salmonellae and total plate counts of animal byproducts from 10^4 through 10^7 bacteria per gram. Samples having plate counts greater than 10^7/g. showed a decreasing rate of salmonellae

7.50 (9.19)

These difficulties can be avoided by forming multihalogenated acetate derivatives of the carbamate before subjecting it to GLC. Fluorometry, GC, thin-layer chromatography, and flame photometry were techniques used in analysis for carbamates. Herbicides are composed of various classes of compounds. The review articles were segregated according to class of compounds in the herbicides. Acidic herbicides were converted to nitro derivatives, after extraction and cleanup, and subjected to TLC. Further conversion to amines, diazotization, and coupling to another compound was necessary for visualization of the results. Analysis of herbicides containing triazines, nitrogen, phenoxyacetic acid, chlorophenoxy acid, and other compounds were reviewed. Analytical procedures for fungicides, agaricides (a type of fungicide), and pesticides too difficult to classify were listed to complete the review.
[411 references] SW

7.42

eliminating the interference of isotopes with long half-lives by spectrum subtraction and correcting for their contributions in the region of the ^{77m}Se photopeak. Comparisons were made between results obtained using this procedure and results obtained from other techniques in the analysis of a National Bureau of Standards (NBS) bovine liver standard containing trace amounts of Se. The results of this suggested procedure compared well with the values given for the NBS standard. The authors suggest that the number of selenium analyses that can be run during a normal working day, including spectral analyses and data reduction, can approach 150 samples.
[5 figures, 2 tables, 14 references] SW

7.86 (0.5)(6.55)

isolations. This decrease is probably due to overgrowth of salmonellae by other bacterial species during enrichment or plating, or both.

Animal byproducts are probably one of the few materials where a linear relationship exists between total counts and the incidence of salmonellae. The table that follows indicates the number of samples of animal byproducts required to detect salmonellae when the total plate count is known.

Total plate count per g. of animal byproduct	Probability of detecting salmonellae if only one animal byproduct sample is analyzed	Minimum number of samples needed to ensure detection of at least one positive sample
($\log_{10}$)		
4-5	0.40	10
5-6	0.47	8
6-7	0.55	6
7-8	0.63	5

[3 tables, 9 references] FTP

7.8 BIOCHEMICAL AND MICROBIAL STUDIES ON SHRIMP: VOLATILE NITROGEN AND AMINO NITROGEN ANALYSIS

Cobb, Bryant F., III, Inelda Alaniz, and Charles A. Thompson, Jr. (Dept. of Animal Science, Texas A & M University, College Station, TX 77843)
Journal of Food Science 38, No. 3, 431-436 (Mar.-Apr. 1973)

The analysis of trimethylamine (TMA), dimethylamine (DMA), and total volatile nitrogen (TVN) in shrimp by the microdiffusion procedure [E. J. Conway, "Microdiffusion Analysis and Volumetric Error," MacMilliam Co., New York (1958), p. 199] was investigated, and certain differences in total volatile nitrogen (TVN) values obtained when shrimp were stored directly in ice as compared to those stored directly under refrigeration (in petri dishes) were examined. The interference of NH_3 and DMA in the analysis for TMA was reduced in the Conway microdiffusion procedure by using a saturated $Na_3PO_4 \cdot KOH$ solution as the releasing agent in place of K_2CO_3 solution. The authors present analytical procedures for (1) simultaneous analysis of DMA and TMA, (2) for obtaining TVN values reflective of NH_3 + TMA content of shrimp, (3) a rapid method for estimating TVN values in shrimp extracts, and (4) a rapid, simple colorimetric test for amino nitrogen (AN). The authors found that the ratios of TVN/AN appear to be more reflective of shrimp quality than do TVN values alone.
[5 figures, 3 tables, 18 references] FTP

8.0 ELEMENTARY CHEMICAL COMPOSITION OF PINK SALMON SCALES

Klokov, V. K., and L. A. Frolenko (U.S.S.R.)
Chemical Abstracts 78, No. 5, 26727c (Feb. 5, 1973)

8.0 CHANGE IN FREE FATTY ACID COMPOSITION
DURING ACING OF SALTED HERRING

Nasedkina, E. A., and T. V. Belova (U.S.S.R.)
Chemical Abstracts 78, No. 5, 28084q (Feb. 5, 1973)

8.8 (6.54) FLAVOR QUALITY OF VARIOUS GRAIN FLOURS AND OILSEED, MILK AND MARINE PROTEIN SUPPLEMENTS

Maga, J. A., and K. Lorenz (Dept. of Food Science and Nutrition, Colorado State University, Fort Collins, CO 80521)
Journal of Milk and Food Technology 36, No. 4, 232-236 (Apr. 1973)

Because of worldwide interest in supplementing major grains (rice, wheat, corn) with animal, vegetable, and marine protein sources, the researchers carried out a study to evaluate the flavor properties of the flour of these grains and of compatible supplements. Flavor evaluations were made by use of sensory panels, by gas-liquid chromatographic analysis of volatile components, and by estimation of the carbonyl content of the products. The objective was to demonstrate the flavor assets and the flavor limitations of the grains and supplements tested. Twelve commercial products were evaluated: whole wheat flour, low-heat nonfat dry milk, sodium caseinate, buttermilk solids, defatted soy flour, full-fat soy flour, isolated soy proteinate, rice flour, fish protein concentrate, peanut flour, and cottonseed flour. To provide background information on the various products, proximate composition of samples of each was determined. The odor intensity of the powders and of the powders suspended in freshly distilled and demineralized water was examined. Flavor intensity was determined on the samples in liquid suspension. Overall blandness was estimated by combining blandness values for the odor intensity and the flavor intensity of the samples in liquid suspension.

The odor of corn flour, full-fat soy flour, rice flour, and peanut flour was more bland in the liquid state than in the dry state. The nonfat dry milk, buttermilk solids, and rice flour appeared to be the most bland; fish protein concentrate

8.8 (7.85) SMOKED MULLET QUALITY: AN ASSESSMENT

Koburger, John A., and Von T. Mendenhall (Food Science Dept., University of Florida, Gainesville, FL 32601)
Journal of Milk and Food Technology 36, No. 4, 194-195 (Apr. 1973)

A survey was made of 12 processors of smoked mullet in Florida and 33 retail samples of the product were analyzed for proximate composition and bacteriological condition. Bacteriological analyses did not reveal any public health hazard but the authors suggest that certain aspects of the production of the product could be improved. Data are given on total count and counts of coliform, staphylococci, enterococci, and yeast and molds. Data on the proximate composition of smoked mullet from four different producers are shown in the table that follows.

Plant number	Proximate composition of smoked mullet sample			
	Moisture	Fat	Protein	Ash
	%	%	%	%
1	63.7	8.4	26.2	1.7
2	65.0	7.0	26.8	1.2
3	54.0	9.8	35.0	1.2
4	63.5	8.2	26.2	2.1
avg.	61.5	8.4	28.6	1.6
Fresh fish	73.5	7.0	18.0	0.5

[2 tables, 8 references] FTP

9.15 (9.16) BROKEN BACK SYNDROME TIED TO VITAMIN C DEFICIENCY

Anonymous
Fish Farming Industries 4, No. 3, 23 (June-July 1973)

Experiments were performed in May 1972 by R. P. Wilson, biochemist at Mississippi State University, on vitamin C deficiency in catfish. Catfish fed a commercial catfish ration with zero content of vitamin C were found to have deficiency symptoms 3 months after the beginning of the trial. The symptoms included a darkening of overall pigmentation and a vertical depigmented band behind the dorsal fin and an inability to swim freely. Gross pathology observed on opening the fish included hemorrhagic areas along the spinal column with overlapping, separated vertebrae behind the dorsal fin. No deformed fish were found in the control groups fed rations containing vitamin C. The livers and kidneys of the normal fish contained 10 times more vitamin C than those of the fish on the vitamin C-free diet.

Wilson recommended that the ration for cage culture of fish contain added vitamin C. He suggested broken back syndrome is not found in pond grown fish because the fish obtain sufficient vitamin C from aquatic organisms they find in the pond.

[1 photograph, 1 table] SW

8.8 DIFFERENCE TASTE THRESHOLDS FOR SODIUM CHLORIDE AMONG YOUNG ADULTS: AN INTERLABORATORY STUDY

Johansson, Birgit, and Birger Drake (Swedish Institute for Food Preservation Research, S-400 21 Göteborg, Sweden), Rose Marie Pangborn (Food Science & Technology, University of California, Davis, CA 95616), Nina Baryłko-Pikielna (Polish Meat Research Institute, Warsaw, Poland), and Egon Köster (Psychological Laboratory, Utrecht, Netherlands)
Journal of Food Science 38, No. 3, 524-527 (Mar.-Apr. 1973)

Individuals within the same laboratory often show large variability in sensory response to chemical stimuli. For example, E. Knowles and P. E. Johnson [Food Research 6, 207-216 (1941)] demonstrated that the absolute threshold for detection of sodium chloride ranged from 0.0058 to 0.468% within the same laboratory. This paper reports the results of a study of the degree to which differential sensitivity to a simple taste sensation differed among groups of persons and among laboratories in widely separated locations. Using a method of constant stimuli, different thresholds (expressed as jnd [just noticeable difference] values or Weber ratios) for the taste of sodium chloride at two standard concentrations were determined at four different laboratories in four different countries.

The total jnd values and (Weber ratios) for the four laboratories were: at the standard concentration of 0.30% sodium chloride--0.021% (0.070); 0.022% (0.073); 0.026% (0.087); 0.031% (0.103); and at the standard concentration of 0.80% sodium chloride--0.049% (0.062); 0.042% (0.053); 0.058% (0.073); 0.097% (0.121). At both of the standard sodium chloride concentrations, the jnd values for three of the laboratories were in fairly good agreement, but the values for the fourth laboratory were significantly higher. [4 figures, 2 tables, 14 references] FTP

8.8 FLAVOR THRESHOLDS FOR FATTY ACIDS IN BUFFERED SOLUTIONS

Baldwin, Ruth E., and Marion R. Cloninger (Dept. of Food Science & Nutrition, University of Missouri-Columbia, Columbia, MO 65201), and Robert C. Lindsay (Dept. of Food Science, University of Wisconsin-Madison, Madison, WI 53706)
Journal of Food Science 38, No. 3, 528-530 (Mar.-Apr. 1973)

Ethanoic, butanoic, hexanoic, octanoic, and decanoic (fatty) acids help contribute to the characteristic flavor of dairy products and other foods. The levels at which the flavor of these fatty acids are detectable (recognition threshold) in citrate-phosphate buffer systems at pH of 3.2, 4.5, and 6.5 were determined. The citrate-phosphate buffer was used because this system does not introduce ions foreign to food products. Paired comparison tests were used; samples consisted of a buffer solution and a buffer solution containing fatty acid. In the preliminary tests, the researchers found that the judges tended to rely on aroma for detection of fatty acid at low pH levels, and upon taste or flavor at higher pH levels. Therefore, for butanoic acid and decanoic acid, they determined taste and aroma thresholds as well as flavor threshold. The judges evaluated taste while using nose clips; they evaluated aroma by sniffing the sample; and they judged flavor by checking for flavor in the mouth (without the use of nose clips).

Increased levels of the various fatty acids were required for recognition of their flavor as the pH of the buffer carrier increased from 3.2 to 4.5 to 6.0. Thus, the flavor these fatty acids contribute to a food might be expected to increase as the pH of the food decreases. For the butanoic and decanoic acids, aroma and flavor thresholds were more similar than were taste and flavor thresholds; therefore, aroma apparently contributed more than did taste to the flavor of these acids. [1 figure, 2 tables, 15 references] FTP

9.15 (9.6) DISEASES OF FISH

Mawdesley-Thomas, L. E. (editor)
In Symposia of the Zoological Society of London, No. 30.
Published by Academic Press, London and New York (1972), 380 pp. Price $21.00.
James W. Warren (reviewer) (Bureau of Sport Fisheries and Wildlife, Genoa, WI 54632)
Transactions of the American Fisheries Society 102, No. 2, 502-503 (Apr. 1973)

The papers in the book concentrate on diseases of fish, causative agents, and the pathological changes that result. The reviewer suggests that a serious fault of the book is that it lacks an article on parasitic diseases of fish. In addition, the editor has given more than 30% of the book to his own field, tumors. The book also contains a paper on infectious dropsy in carp, which the reviewer praised as one of the best in the field of fish diseases. The etiology of ulcerative dermal necrosis was well reported in another article. In an article on bacterial diseases, the author erroneously assigned the agent of redmouth of trout to Aeromonas liquefaciens. The reviewer acquiesced with the editor in the conclusion that fish pathology must develop as a scientific entity of its own. SW

8.8 (6.54)

and peanut flour, the least bland. The total GLC peak areas were the greatest for isolated soy proteinate and smallest for sodium caseinate. Total carbonyl content ranged from 4 p.p.m. (for buttermilk solids) to 230 p.p.m. (for full-fat soy flour); carbonyl content of fish protein concentrate was around 15 p.p.m. Proximate composition data are shown in the following table:

Product	Proximate composition				
	Moisture	Protein	Fat	Ash	Fiber
	%	%	%	%	%
Whole wheat flour	11.8	13.1	2.1	1.6	2.2
Non-fat dry milk	3.0	35.9	0.8	8.0	0.0
Sodium caseinate	3.6	90.3	1.0	4.1	0.0
Buttermilk solids	2.8	34.3	5.3	7.6	0.0
Corn flour	12.1	7.7	2.7	0.7	0.7
Defatted soy flour	6.8	51.9	0.8	7.1	2.3
Full-fat soy flour	8.2	38.8	19.6	4.7	4.0
Isolated soy proteinate	4.5	92.5	0.1	4.0	0.2
Rice flour	11.9	6.6	0.5	0.5	0.4
Fish protein concentrate	2.2	78.1	0.4	19.1	0.0
Peanut flour	7.2	48.1	9.4	4.0	2.9
Cottonseed flour	6.2	48.0	6.5	6.1	2.1

[6 figures, 1 table, 18 references] FTP

9.14 (1.92) EFFECTS OF THREE DIETARY CALCIUM AND PHOSPHORUS LEVELS ON THE GROWTH AND MINERAL RETENTION OF CHANNEL CATFISH FINGERLINGS (ICTALURUS PUNCTATUS)

Dove, George Robert (Kansas State Univ., Manhattan, Kans.)
Chemical Abstracts 78, No. 7, 41912c (Feb. 19, 1973)

9.14 (9.13)(1.37) EFFECT OF HIGH-CAROTENE SUPPLEMENTARY VEGETABLE FEED ON THE VITAMIN A CONTENT OF RAINBOW TROUT FRY (SALMO GAIRDNERI)

Steffens, W., and H. Karst (Inst. Binnenfisch. Berlin-Friedrichshagen, Berlin/Friedrichshagen, East Germany)
Chemical Abstracts 78, No. 9, 56769k (Mar. 5, 1973)

9.16 (1.69) THE STORAGE OF PLAICE (PLEURONECTES PLATESSA) SPERM AT LOW TEMPERATURES

Pullin, R. S. V. (Marine Biological Station, Port Erin, Isle of Man, United Kingdom)
Aquaculture 1, No. 3, 279-283 (Dec. 1972)

Sperm storage is potentially useful in aquaculture because the male component of the breeding stock can be held at low cost, and it allows for selection and retention of good strains of fish. In addition, transportation of deep frozen sperm containers is cheaper, easier, and involves less risk of spreading infectious diseases than shipment of live male fish. There is a large research effort underway throughout the British Isles to develop techniques for the cultivation of marine flatfish, and plaice is the species chosen for most of the experiments. One of the experiments was a preliminary investigation into the low temperature storage of marine flatfish sperm.

Plaice sperm, diluted in sodium chloride solution containing penicillin and sealed in 1 ml. ampoules, were deep frozen at -79° C. and -196° C. After 315 days' storage at -196° C. samples from three different fish were thawed and a small amount from each was examined for motility. The remainder of each ampoule was mixed with about 500 freshly taken eggs. The results of the examination showed high motility; in addition, the appearance of the frozen sperm was identical to fresh sperm. Sperm frozen at -196° C. successfully fertilized 50% of the eggs, and cleavage of the developing eggs appeared normal after 48 hr. Fresh sperm used as a control fertilized 85% of the eggs. Sperm stored at -79° C. showed little or no motility on

9.16 THE COMMERCIAL FEASIBILITY OF REARING POMPANO, TRACHINOTUS CAROLINUS (LINNAEUS), IN CAGES

Smith, Theodore Isaac Jogues
Sea Grant Technical Bulletin No. 26, Information Services, University of Miami, Sea Grant Institutional Program, 10 Rickenbacker Causeway, Miami, FL 33149 (1973), ix + 66 pp. Price $3.00.

Attempts at culture of the Florida pompano have achieved limited success. Pompano appear to be suitable for aquaculture because they grow rapidly in captivity and they can endure a wide range of environmental conditions. This species of fish is in great demand for food and it commands the highest retail price of all the fishes landed in the southern United States. Because of these considerations, the researcher attempted to assess the suitability of rearing pompano in cages and to determine the growth and mortality of the fish at stocking densities that would be practical under commercial-scale operations.

The pompano were reared in 1 $m.^3$ aluminum cages (6.4-mm. mesh) at five stocking densities of 100, 250, 400, 650, and 900 fish per cubic meter. Marketable-size fish (1 lb. or 454 g.) were obtained within 47-51 weeks (starting with a 7 g. fish). The growth rate and yield per fish stocked were significantly higher at the lower stocking densities. The highest total yield of 113 and 116 $kg./m.^3$ were obtained at the highest stocking density. The author believes that the cages were used below their maximum carrying capacity and that greater yields may be possible. The mean mortality was 16% at stocking density of 100 and about 24% (the highest)

9.17 (1.93) THE SURVIVAL SITUATION OF THE HAWKSBILL SEA-TURTLE (ERETMOCHELYS IMBRICATA) IN MADAGASCAR

Hughes, George R. (Oceanographic Research Institute, P.O. Box 736, Durban, Natal, South Africa)
Biological Conservation 5, No. 2, 114-118 (Apr. 1973)

Although the green turtle is more abundant than the hawksbill sea turtle, the latter made Madagascar famous as a source of tortoiseshell. Export of this product was maintained (4,000 kg. annually) through the 19th and to the turn of the 20th centuries. After World War I, a decline set in, and presently, the trade is very small. The drop in exports occurred before the advent of plastic substitutions; however, the demand for tortoiseshell continued to remain high. The cause of the decline is due to overexploitation. In spite of the numbers of the sea turtles taken, the author reports that there are still substantial numbers in the coastal waters of Madagascar, particularly the northern third of the island which constitutes the major nesting ground. Although not as great as in the past, the current value of hawksbill products justifies rigorous enforcement of existing laws regulating the catch of this turtle. The meat of all other sea turtles is used for food; in contrast, the meat of the hawksbill turtle is not edible and may have toxic properties. It is usually discarded. The author concluded that the present population of hawksbill, with protection of nesting females, could be restored to a safer level; this change could result in an increased source of revenue, and renew one of the great concentrations of this sea turtle.
[5 figures, 2 tables, 5 references] SW

9.16

at stocking density of 650; overall mortality was 21% (half of this amount was attributed to an inadequate diet).

The cost of feed to produce 1 kg. of pompano was $1.70 at stocking density of 100 and $2.17 at stocking density of 900. However, the greatest profit ($160 per cage) was achieved at the highest stocking density.

Some monogenetic trematodes and some body abrasions on the fish were noted, but no significant disease or parasitic infestation occurred. The biggest problems involved heavy fouling of the cages and development of poor quality water.

Some of the pompano were released after they had been conditioned to the cages. These released fish remained and fed in the area in which they were conditioned, suggesting the possibility of culturing this species without the use of confining structures.

[6 figures, 13 tables, 64 references] FTP

9.16 INTENSIVE WARMWATER FISH CULTURE
(1.92)

Allen, Kenneth O. (Fish Farming Experimental Station, Stuttgart, Ark.)
Fish Farming Industries 4, No. 3, 24-26 (June-July 1973)

The culture of warmwater fishes--such as catfish--in raceways, tanks, and cages (in contrast to pond culture) is being investigated with promising results. There are several species of warmwater fish besides channel catfish that may be suitable for this type of culture. The Israeli carp is one possibility, because it tolerates crowded conditions and can be easily marketed in certain areas. Other fish that have been investigated with promising results are striped bass and largemouth bass. White crappie, white catfish, and black bullheads have been found slow in growth compared to channel catfish.

Most warmwater fishes grow best at temperatures in the low or mid-80's. The quality of the water should be maintained by changing the water once for every 1 to 1½ hr. the fish are in the raceways and tanks. In addition, the water should originate from a spring or well and be free of disease organisms. Total alkalinity should be above 40 p.p.m.; excessive gases or minerals such as nitrogen or iron should not be present. Disposition of water after it leaves culture facilities may be either release into public waters after lawful standards have been satisfied or reuse after treatment to reduce the number of disease organisms. Effluent water from catfish raceways has been used to grow plankton and detritus feeders such as tilapia, buffalo fish, and shellfish with good results.

The disadvantages of raceway and tank culture are as follows: compared to pond culture, a more costly, nutritionally complete feed is required; a higher incidence of disease due to crowding occurs; and failure of water supply equipment can cause costly fish losses quickly. [4 photographs] SW

9.16 THE INFLUENCE OF DIETARY PROTEIN AND ENERGY LEVELS
(1.85) ON GROWTH AND SURVIVAL OF PENAEID SHRIMP

Andrews, James W., Lowell V. Sick, and Garry J. Baptist (Skidaway Institute of Oceanography, P.O. Box 13687, Savannah, GA 31406)
Aquaculture 1, No. 4, 341-347 (Mar. 1973)

Rearing shrimp under aquaculture conditions requires a diet which will promote optimal growth. The specific nutrient requirements of shrimp, particularly the utilization of protein, carbohydrates, and lipids, are not yet established. To help provide some information, a study was conducted to generate preliminary data on the growth response of shrimp to various levels of these three basic dietary substances.

Two feeding experiments were conducted. In the first, a series of 14 semipurified formulations were fed to triplicate groups of 10 juvenile shrimp housed in 400-l. round culture tanks. The diets contained 28% to 52% protein (mostly fish meal), 0% to 40% glucose, and 0% to 20% supplemental lipid. All formulations, including those in the second experiment, contained 5% collagen as a binder. The formulations were then extruded and pelleted. In the second experiment, 12 diets were fed for 8 weeks to the same number of shrimp per diet as in the first experiment. These diets contained 14% to 32% protein, 0% to 30% starch, and 0% to 10% supplemental lipid.

Results from experiment No. 1 indicated that 28% protein in the formulation was the best level without supplemental glucose or lipids. Results from the second experiment indicated that shrimp fed diets containing 14% or 23% protein and 30% supplemental starch had higher growth rates than shrimp on diets without supplemental starch. Other results indicated that shrimp fed diets containing lipid supplement had lower survival rates than those on diets without lipid supplement. (4 tables, 11 references] SW

9.16 (1.69)

thawing, and showed no evidence of capability to fertilize eggs. This result surprised the author because cod sperm was previously reported to be viable at this temperature. Since -79° C. temperatures are generally more available through use of solid carbon dioxide, more investigations into storage at this temperature should be undertaken.

[1 table, 6 references] SW

9.16 APPARATUS FOR GROWING CRUSTACEANS

Day, John J., and Paul S. Hirschman (Fort Lauderdale, Fla.) (pat.)
U.S. Patent 3,724,423 (Apr. 3, 1973)

The apparatus is used for growing certain crustaceans (shrimp) during their postlarval period. It contains a series of interconnecting tanks. Filtered water, maintained at the desired temperature, is continually recirculated through each tank. FTP

9.19 SUMMARY OF RECENT STUDIES IN JAPAN ON METHYL MERCURY POISONING

Kojima, Kohei (Environmental Sanitation Bureau, Ministry of Health and Welfare, Tokyo, Japan), and Masahiko Fujita
Toxicology 1, No. 1, 43-62 (Mar. 1973) (Published by Elsevier/North-Holland, Amsterdam, Netherlands)

The summary is divided into six sections. The first deals with methyl mercury in the environment. Reports on the presence of mercury pollution in the Minamata District in Japan indicated that the level of mercury in local fish and shellfish fell markedly. In humans, the level is gradually falling. Other reports cover methyl mercury and inorganic mercury in fish, birds, and animals, river sediments, and effluents from the chlorine industry. The second section consists of summaries of reports on the methylation of inorganic mercury and the decomposition of organic mercury. Methylation could be accomplished nonenzymatically, and by biological agents such as bacteria and yellowfin tuna liver homogenates; ultraviolet irradiation aided the conversion. Organic mercury compounds were reported to be removed from industrial wastewater by treatment with aluminum powder, exchange resin, and sodium sulfide. Microorganisms and plant roots were found to decompose organic mercurials. The third section covers the pathology followup of patients in the Minamata and Niigata Districts (where mass mercury poisoning occurred) of Japan. The fourth section is a review of reports on metabolism of mercury in animals. In rabbit blood studies, mercury was found to concentrate in the erythrocytes. Cats fed methyl mercury sulfate developed symptoms found in cats fed fish from Minamata Bay. Rats poisoned with mercury were found to have

9.19 TOXICITY OF METHYL MERCURY FOR STEELHEAD TROUT SPERM
(1.37)

McIntyre, J. D. (Oregon Cooperative Fishery Unit, Oregon State University, Corvallis, OR 97331)
Bulletin of Environmental Contamination and Toxicology 9, No. 2, 98-99 (Feb. 1973)

Tests were performed to determine the concentrations of methyl mercuric chloride that would reduce the viability of sperm of steelhead trout. The sperm was obtained from five fish, pooled, and inoculated into test tubes containing a range of methyl mercuric chloride concentrations in 0.85% sodium chloride solution maintained at 11° C. The concentrations of mercury ranged from 1 g. per liter to 10 mg. per liter. After 30 min., each sperm-containing solution was combined with 100 steelhead eggs (from a single female). After 1 min., each group of eggs was washed and placed in an incubator tray. The percentage of fertilization was determined 16 days later. The percentage of eggs that were not fertilized indicated that concentrations of mercury of 1.0 p.p.m. or greater reduced sperm viability.
[1 table, 2 references] SW

9.19 FATE OF DIELDRIN IN SELECTED SPECIES OF MARINE ALGAE

Rice, Clifford P., and Harish C. Sikka (Syracuse University Research Corporation, Syracuse, NY 13210)
Bulletin of Environmental Contamination and Toxicology 9, No. 2, 116-123 (Feb. 1973)

Marine phytoplankton are primary producers and are in the first level of build-up of persistent pesticides such as dieldrin. These organisms react to the pesticide in varying degrees; dieldrin concentrations up to 1,000 p.p.b. had no effect on photosynthesis in certain species, but the photosynthesis of other species was affected by as little as 1 p.p.b. The dieldrin accumulated by the algae may be metabolized into more persistent and more toxic substances than the original compound. The accumulation and metabolism of dieldrin was investigated in organisms representing five algal divisions--Bacillariophyta, Pyrrophyta, Xanthophyta, Chrysophyta, and Euglenophyta. Pure cultures of algae mixed with ^{14}C-dieldrin in acetone were incubated on a rotary shaker. After exposure to dieldrin the cells were centrifuged and washed and resuspended in scintillation fluid for counting. The uptake of dieldrin by the organisms was then determined.

The metabolism of ^{14}C-dieldrin was investigated also. Pure cultures of algae were incubated with the radioactive pesticide for 2 weeks. The cells were then centrifuged and extracted with acetone. The extracts were analyzed by gas-liquid and thin-layer chromatography.

The results indicate that when cells were exposed to various concentrations of dieldrin, its uptake by the cells increased as the concentration increased up to 1,000 p.p.b. In suspensions containing cell densities ranging from 0.1 to 1.3

9.19 DEGRADATION OF METHYLMERCURY BY BACTERIA ISOLATED FROM
(0.5) ENVIRONMENTAL SAMPLES

Spangler, William J., James L. Spigarelli, Joseph M. Rose, Reid S. Flippin, and Hope H. Miller (Midwest Research Institute, Kansas City, MO 64110)
Applied Microbiology 25, No. 4, 488-493 (Apr. 1973)

This study showed that several bacterial species, capable of degrading methylmercury, are easily isolated from environmental samples and that they could be responsible for rapid turnover of methylmercury formed in sediments. The samples consisted of fish and sediment from the delta area of Lake St. Clair, Mich. Two hundred and seven bacterial cultures, isolated from these environmental samples, were screened for their ability to degrade methylmercury. Thirty of the cultures were positive for aerobic demethylation of methylmercury without previous adaptation to the compound. Of these 30 isolates, 22 were facultative anaerobes, and 21 of them were capable of anaerobic demethylation. Two of the positive isolates were gram-positive cocci, two were gram-positive rods, and the rest were gram-negative rods with characteristics typical of Pseudomonas. Methylmercury degradation was complete in most cases; however, material balances indicated that some of the inorganic mercury formed was not volatilized (presumably it is bound to the cells). All the positive cultures were tolerant to at least 0.5 µg. of methylmercury per milliliter; the extent of volatilization of mercury increased with the level of mercury up to this threshold value.
[1 figure, 5 tables, 7 references] FTP

9.19

mg. per 10 ml. with a constant dieldrin concentration of 1.7 p.p.b., the uptake of the dieldrin increased as the cell density increased. The various species (at a cell density of 0.2 mg. per ml.) differed in their ability to remove dieldrin (at a concentration of 1.7 p.p.b.) from the medium; Skeletonema costatum of the Bacillariophyta removed 42.0%, and Amphidinium carteri of the Pyrrophyta removed only 2.3%. Analysis of cell extracts indicated that dieldrin remained unchanged in the algal cells after 2 weeks of incubation and was not metabolized.
[3 figures, 1 table, 9 references] SW

Granmo, A. (Kristinebergs Zool. Stn., Fiskebackskil, Sweden)
Chemical Abstracts 78, No. 9, 53569j (Mar. 5, 1973)

9.19 DEVELOPMENT AND GROWTH OF EGGS AND LARVAE MYTILUS EDULIS EXPOSED TO LINEAR DODECYL BENZENESULFONATE, LAS

9.19

high levels in peripheral nerves. The fifth section is a survey of reports on pathology and toxicology in animals. The cellular changes in the endoplasmic reticulum, cerebellum, liver, kidney, and spleen were described. The sixth section deals with mercury levels in the human body. The data showed that an estimated 24 mg. of mercury was present in a Japanese adult of 50 kg. One report indicated that the mercury content of a urinary calculus taken at autopsy was 1,000 times that of normal human urine.
[83 references] SW

De Goey, J., J. M., J. P. W. Houtman, P. S. Tjioe, and J. H. Koeman (Interuniv. React. Inst., Delft, Netherlands)
Chemical Abstracts 78, No. 9, 53536w (Mar. 5, 1973)

9.19 MERCURY DISTRIBUTION LEVELS OBSERVED IN VARIOUS ECOSYSTEMS AS DETERMINED NEUTRON ACTIVATION ANALYSIS

9.19 (0.8) STRUCTURE AND FUNCTIONING OF ESTUARINE ECOSYSTEMS EXPOSED TO TREATED SEWAGE WASTES III. 1971-1972

Kuenzler, Edward J., Alphonse F. Chestnut, and Charles M. Weiss (Dept. of Environmental Sciences and Engineering and the Institute of Marine Sciences, University of North Carolina)
Sea Grant Publication UNC-SG-73-10, Sea Grant Program, School of Public Health, University of North Carolina, Chapel Hill, NC 27514 (Mar. 1973), 223 pp.

This report, the fifth in a series, deals with investigations of the ecological systems which develop in small brackish water ponds enriched with domestic sewage (which had received secondary treatment). In this study, three ponds (controls) received a constant flow of water from Bogue Sound (sea water), which was diluted with tap water to reduce its salinity. Three waste ponds received an intermittent flow of water from Calico Creek (fresh water) mixed with some of the effluent from the Morehead City, N.C., sewage treatment plant. Observations were made to obtain an understanding of the ponds and of their functioning as ecological systems. The earlier reports presented details on populations of phytoplankton, zooplankton, fishes, crustaceans, molluscs, and foraminifera, and information on carbon budget, the phosphorus kinetics, the nitrogen metabolism, primary productivity, and bacterial heterotrophy in the ponds. Other articles in the reports dealt with populations and processes of nearby estuaries and salt marshes; growth of Ulva and Spartina; hydrography and phytoplankton of Calico Creek; microarthropods and insects; fiddler crabs; and salt marsh snails.

This fifth, and final report of the project contains 18 articles dealing with the research work carried out from July 1971 to Dec. 1972. It contains information on phytoplankton, zooplankton, bacteria, nutrients, fishes, etc.; and some discussion of aquaculture potential. FTP

9.19 GAS-LIQUID CHROMATOGRAPHIC SEPARATION OF SULFUR FROM CHLORINATED PESTICIDE RESIDUES IN WASTEWATER SAMPLES

Baird, R. B., L. G. Carmona, and C. L. Kuo (County Sanitation Districts of Los Angeles County, Whittier, CA 90601)
Bulletin of Environmental Contamination and Toxicology 9, No. 2, 108-115 (Feb. 1973)

Colloidal sulfur and organosulfur compounds resulting from bacterial activity are reported to be found in industrial discharges, human and animal wastes, and mineral sources. Analyses for chlorinated pesticides such as two forms of DDE, aldrin, lindane, and heptachlor by gas-liquid chromatography have been reported to be hampered by the presence of sulfur when electron capture detectors were used. Sample cleanup using acetonitrile-hexane or hexane-ether partitioning and adsorption chromatography was also found to be inadequate for separation of large amounts of sulfur. To overcome the problem of sulfur interference and not use time-consuming alternatives, the authors devised a mixed column packing which provides the necessary resolution for analysis of chlorinated pesticides. The column packing consisted of a mixture of 4.4% (w/w) OV-17, 4.7% QF-1, and 1.0% DC-200, on 80/100 mesh Gas-Chrom Q solid support. Each liquid phase was coated separately on a portion of the support, and the coated portions were combined before packing into 6 ft. by 1/8 in. i.d. glass columns. After packing, the columns were conditioned at 250° C. for 8 to 10 hr. before use. The gas chromatographs were fitted with electron capture detectors, and the carrier gas was 5% methane/argon at a flow rate of 40 ml. per minute. The detector, oven, and injection port temperatures were 250°, 220°, and 235° C., respectively. The results of routine use of the mixed column showed that sulfur interference was eliminated in the analysis of sulfur-containing wastewaters for chlorinated pesticides.
[4 figures, 8 references] SW

9.19 PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY. I. SURVEY OF HYDROCARBONS IN SEDIMENTS AND CLAMS (MERCENARIA MERCENARIA)

Farrington, John W., (Chemistry Dept., Woods Hole Oceanographic Institution, Woods Hole, MA 02543, U.S.A.), and James G. Quinn (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881, U.S.A.)
Estuarine and Coastal Marine Science 1, 71-79 (1973) (Henry Ling Ltd., Dorset Press, Dorchester, Dorset, United Kingdom)

As part of a larger research study of the biogeochemistry of lipids in recent estuarine sediments and benthos, the authors analyzed the hydrocarbons in the surface sediments (0 to 8 cm.) and clams from three stations in Narrangansett Bay, R.I. The sediment and the clams contained a complex mixture of hydrocarbons; these hydrocarbons were not present in clams from Charlestown Pond, a relatively unpolluted coastal pond. These hydrocarbons are also present in crude oils and fuel oils, and the contamination of the sediment and clams appears to come from the discharge of petroleum hydrocarbons in sewage effluents and from small oil spills. The authors suggest that efforts to reduce the occurrence of large accidental oil spills should also be accompanied by efforts to reduce the constant dribbling of oil into the marine environment by sewage effluents, storm sewers, industrial effluents, tanker-shoreline storage area transfers, and small craft operators. The data in this report should help describe the present status of the Narragansett Bay estuary and are useful for assessing its recovery or its future deterioration by petroleum contamination.
[2 figures, 1 table, 31 references] FTP

9.19 THE ECOLOGY OF THE SOUTHERN CALIFORNIA BIGHT: IMPLICATIONS FOR WATER QUALITY MANAGEMENT

Prepared by the staff of the Southern California Coastal Water Research Project SCCWRP TR104, Southern California Coastal Water Research Project, El Segundo, Calif. (Mar. 1973), 531 pp. Price $15.00. (Available from the SCCWRP, 1500 East Imperial Highway, El Segundo, CA 90245)

A 3-year study of the ecology of southern California coastal waters indicated that some of the concern expressed in recent years over the possible harmful effects of municipal wastewater discharges is exaggerated. The study, which consisted of literature review, laboratory and field programs, and predictive modeling, involved characterization of the general physical, chemical, and biological conditions in the nearshore waters as well as detailed examination of conditions near major wastewater outfalls. Sources of various substances (particulate materials, oil and grease, plant nutrients, trace metals, chlorinated hydrocarbons, etc.) were identified, and input magnitudes were estimated; the study revealed little or no justification for altering present municipal wastewater treatment or discharge practices with regard to the constituents examined, with the exception of floatable materials, highly toxic metals, and chlorinated hydrocarbons. In particular, inland wastewater treatment requirements (such as those relating to biochemical oxygen demand, suspended solids, and nutrients) were found to have little technical relevance to marine ecological problems. Other topics covered in the study (and recommended for further investigation) included diseases in nearshore fishes, indicator organisms, population and community interactions of

9.19 (1.0146) (1.0147) IMPLICATIONS OF DISPOSAL OF WASTES TO THE NORTH SEA. EFFECTS ON LIVING RESOURCES, ESPECIALLY FISHERIES

Cole Herbert A. (Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, England)
Chemistry and Industry, No. 4, 162-166 (Feb. 17, 1973)

Pollutants of the sea may effect living resources in several ways: (1) killing of fish at a stage in their life cycle; (2) interference with growth. physiology, behavior, and breeding of fish; (3) contamination with persistent toxic substances making fish unfit for food, and consequently, unsalable. These are direct effects, but damage may be inflicted indirectly by altering the environment (the sea water or the sea bed) so that the capacity of the sea to support fish may be damaged. Beneficial results are also possible because of additional nutrients or from selective action against predators and competitors of the fish. Killing of fish and shellfish by pollutants in the open sea is rare. Sea dilution of wastes is very rapid and mobile animals can move away from toxic levels if they choose; sessile animals, such as oysters and clams, cannot move away from pollutants that may concentrate in their environment. Highly toxic wastes are the most injurious. Pesticides such as DDT and dieldrin are toxic to adult brown shrimp at a level of 0.01 p.p.m. Pink shrimp have disappeared from the coast of England, where they were once plentiful, because of pollution. Persistent pesticide pollution may cause biological disturbances such as failure to breed or inability to avoid predators. Contamination of fish and shellfish with persistent and toxic substances also is in the realm of

9.19 ELIMINATION OF MERCURY FROM FISH

Yannai, Shmuel, and Rachel Saltzman (Dept. of Food Engineering and Biotechnology, Technion-Israel Institute of Technology, Haifa, Israel)
Journal of the Science of Food and Agriculture 24, No. 2, 157-160 (Feb. 1973)

Shredded precooked tuna fish was extracted for 2 hr. in different concentrations of dilute HCl solutions containing either 0.33% or 0.066% cysteine. The results are shown in the table that follows.

9.19 (1.0146) (1.047)

public health. Accumulation of heavy metals in food fish may cause illness and death to humans who have eaten them. Foul smelling or tasting pollutants of shellfish are lost slowly; such seafood is a financial loss to the markets, and these markets may be injured because buyers are reluctant to return to a place that sold foul shellfish. In spite of vast amounts of wastes entering the North Sea for decades from densely populated, heavily industrialized countries, the production of cod, haddock, and plaice has been unprecedented. But the production of fisheries in estuarine areas has declined. Loss of the shellfish industry can be traced directly to pollution. The countries bordering the North Sea are expected to demand greater care and restraint in the discharge of wastes into this environment.
[5 figures, 1 table, 24 references] SW

9.19

Test number	Treatment of precooked shredded tuna [1]		Mercury content [2]	Amount of mercury removed
			p.p.m.	%
1	None (control)		0.37	--
	Extracted with, dilute HCl plus 0.33% cysteine	pH 1.3	0.095	74
		pH 1.7	0.13	65
		pH 2.2	0.17	54
2	None (control)		0.53	--
	Extracted with dilute HCl plus 0.33% cysteine	pH 1.5	0.11	79
		pH 2.0	0.23	57
3	None (control)		0.39	--
	Extracted with dilute HCl plus 0.066% cysteine	pH 1.5	0.18	54

[1] The pH and the percentage of the cysteine in the solution in which the extraction was carried out.
[2] Values for treated samples adjusted for difference in moisture content from the control.

The odor and texture of the treated fish were unaffected, and a change in taste was restored by adding a small amount of salt before canning.
[2 tables, 7 references] FTP

9.19 MERCURY LEVELS IN A SAMPLE OF MICHIGAN RESIDENTS

Wilcox, Kenneth R., Jr. (Dep. Public Health, Lansing, Mich.)
Chemical Abstracts 78, No. 9, 53543w (Mar. 5, 1973)

9.19

benthic invertebrates and fishes, stimulatory and toxic effects of wastewater on phytoplankton and benthic organisms, and constituent inputs through industrial discharges, vessel-related activities, dredge spoil, surface runoff, aerial fallout, and advection.
[152 figures, 140 tables, 270 references, 557-entry bibliography, 5 appendices]
Abstractors: Staff of SCCWRP

Bailey, Jack D. (Div. Fish., Michigan Dep. Nat. Resour., Lansing, Mich.)
Chemical Abstracts 78, No. 7, 38855f (Feb. 19, 1973)

9.19 MERCURY IN FISH IN THE GREAT LAKES
(1.0118)

Goring, Cleve A. I. (Ag.-Org. Dep. Dow Chem. Co., Walnut Creek, Calif.)
Chemical Abstracts 78, No. 7, 39067n (Feb. 19, 1973)

9.19 AGRICULTURAL CHEMICALS IN THE ENVIRONMENT
QUANTITATIVE VIEWPOINT

9.19 POLYCHLOROBIPHENYLS IN NORTH ATLANTIC OCEAN WATER

Harvey, George R., William G. Steinhauer, and John M. Teal (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 180, No. 4086, 643-644 (May 11, 1973)

The concentrations of polychlorinated biphenyls (PCBs) were measured at the surface and at various depths of the North Atlantic Ocean. The measurements were made from samples of water taken at 41 locations between 26° N. and 63° N. and 2° W. and 70° W. The samples after extraction and elution treatments, were analyzed for PCBs by electron capture gas chromatography. The results of the study showed the average concentration of PCBs to be 35 p.p.t. in surface waters and 10 p.p.t. at 200 m. deep. The surface waters of the Sargasso Sea stations were found to have slightly lower concentrations of PCBs (27 p.p.t.) than in other stations. The authors believe that the widespread distribution of PCBs in the open North Atlantic Ocean supports previous observations that winds are the dominant mode of transport. They also suggest that the presence of PCBs to depths of 3,000 m. indicates that PCBs sink as burden in dead animals and other debris out of the productive zone. This mode of action prevents higher concentrations of PCBs from accumulating in the productive zone.
[1 table, 5 references] SW

9.19 ODOR CONTROLS FOR RENDERING PLANTS
(6.)(3.18)
(0.8)

Bethea, Robert M. (Texas Tech University, Lubbock, TX 79409), Belur N. Murthy, and Donald F. Carey
Environmental Science & Technology 7, No. 6, 504-510 (June 1973)

The U.S. Environmental Protection Agency (EPA) is considering the development of standards of performance for new rendering plants. One of the probable standards would be to limit the concentration of undiluted odors emitted from any rendering plant to no more than 200 odor units per standard cubic foot (OU/SCF). An odor unit is the quantity of any single odorous substance or combination of substances which, when completely dispersed in 1 ft^3 of odor-free air, is detectable by a median number of observers in a panel of eight or more observers. Odor strength is related intrinsically to the olfactory sensitivity of the smeller; consequently, there is difficulty in defining the intensity of the proposed standard for any one individual.

As of Jan. 1969, there were about 850 rendering plants in the United States; of this total, 93 plants produced fish products; and the remainder were connected with meat and poultry packing operations. The authors estimated that 20 new plants will be built each year in the United States. Each will be of the continuous process type, and odor abatement equipment is expected to be an integral part of the plant.

9.19 AIR POLLUTION

Mueller, Peter K., and Evaldo L. Kothny (State of California, Dept. of Public Health, Air and Industrial Hygiene Laboratory, Berkeley, CA 94704)
Analytical Chemistry, Annual Reviews 45, No. 5, 1R-9R (Apr. 1973)

The review concentrates mostly on literature covering the occurrence and chemistry of airborne particulate matter that has appeared between July 1970 and July 1972. Devices for studying the properties of aerosols provide data on a specific integral function of composition, particle size, and sampling period. There remains a need for full descriptions of the integral function for many of the devices and techniques so that differences in their functions can be considered when comparing data. Studies of phenomena occurring at sampling nozzles were reviewed and listed. Air quality standards for particulate matter are based on visibility in miles and in micrograms per cubic meter. Efforts are continuing to find new techniques and correlations between different methods for measuring similar particulates and to establish equivalence factors among different methods. Implementation of air quality standards requires collecting particles by filtration to determine concentration and composition. New information on source of particulates is needed and other filter media are required to increase collection efficiency of total samples weighing only 10^2-10^3 µg. The piezoelectric quartz crystal application to continuous determination of particulate concentrations has problems that are unresolved. It has found use in airborne instruments to delineate plume diffusion. Size fraction separators of particles in the atmosphere and from emissions have

9.19 INORGANIC NITROGEN REMOVAL FROM WASTEWATER: EFFECT ON PHYTOPLANKTON GROWTH IN COASTAL MARINE WATERS

Goldman, Joel C., Kenneth R. Tenore, and Helen I. Stanley (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 180, No. 4089, 955-956 (June 1, 1973)

Phosphorus has traditionally been viewed as the growth-limiting nutrient in coastal and estuarine environments. In contrast, other reports provide evidence that nitrogen is the phytoplankton growth-limiting nutrient in these environments, and by removing nitrogen from wastewaters, eutrophication may be controlled in the receiving aquatic system.

Experiments were performed to determine the effects of nitrogen removal on the growth of algae in wastewater. Nutrients (mainly nitrogen) were removed from secondarily treated domestic wastewater (diluted with sea water) by allowing marine phytoplankton to grow in it. The effluent from the pond, after this treatment, would not support more phytoplankton growth than sea water alone (without wastewater). When nitrogen (as NH_4Cl) was added back to the mixture of spent effluent and sea water in the pond, the growth response was similar to that with a mixture of unchanged wastewater and sea water. It is this finding which causes the authors to conclude that nitrogen may be the major growth limiting nutrient in coastal marine waters. Tests for phosphate removal in the algal growth system showed that there was a gross excess of phosphorus over nitrogen in the secondarily treated wastewater relative to normal requirements of phytoplankton. The combining of a

9.19

been reported. Cyclones consisting of combining centrifugation, impaction, and filtration have been developed and evaluated for obtaining size distributions and fractions which simulate deposition in respiratory airways. Publications are listed concerning the application of various forms of microscopy to X-ray emission microprobe analysis and computer images to determine the origin of particles. An atlas has been prepared to assist in identification of asbestos and similar fibers by electron microscopy. In the determination of chemical elements in air pollution, the two largest groups have been determined by thermal neutron activation and by X-ray fluorescence. Satisfactory data have not been obtained by these methods for elements of atomic number below 20. Development of the heated graphite oven for sample pretreatment are promising. Analysis of organic emissions and concentrations in air continues to be provided by gas chromatography-mass spectrometry techniques.
[4 tables, 383 references] SW

9.19

tertiary treatment of wastewater with phytoplankton and a marine aquaculture activity (such as oysters), that would consume the phytoplankton, appears to be a means of removing nitrogen from secondarily treated wastewater and thus controlling eutrophication of coastal marine waters. The production of food from the aquaculture system would be an added benefit.
[1 figure, 1 table, 8 references] SW

9.19 INSECTICIDES

Edwards, Clive Arthur (Dep. Entomol. Rothamsted Exp. Stn., Harpenden/Hertfordshire, England)
Chemical Abstracts 78, No. 7, 39068p (Feb. 19, 1973)

9.19 RESIDUES OF DDT IN COD FROM NORWEGIAN FJORDS
(1.51)

Bjerk, J. E. (Veterinary College of Norway, Oslo, Norway)
Bulletin of Environmental Contamination and Toxicology 9, No. 2, 89-97 (Feb. 1973)

The use of DDT as an insecticide has been prohibited in Norway since Oct. 1, 1970. The residual decrease in the environment of DDT has been monitored since then. This paper is a report on residues of DDT in cod taken from local Norwegian waters after DDT was prohibited. Cod taken from the fjords of four districts were examined. At district A there are large fruit orchards and a small forest nursery. At district C there are fruit orchards and at district B a forest nursery only. These three districts had residual DDT from spraying operations. District D had no local source of DDT contamination. The DDT levels in livers of cod taken from Fjords at districts A and C were high, ranging from 12 to 40 p.p.m., wet weight. Cod taken near districts B and D had liver DDT levels of 2.6 and 1.8 p.p.m., respectively. At district A, cod taken near the mouth of the fjord had lower levels of DDT than those caught near the head of the fjord. The author attributed runoff from the fruit orchards as the cause of high DDT levels in cod livers.
[1 figure, 3 tables, 16 references] SW

9.19 (6.) (3.18) (0.8)

Combustion or thermal incineration is the most effective method for controlling high-concentration odors in low volumes of air. Complete oxidation of odorous gases is necessary, otherwise the partial oxidation products may be more odoriferous than the original gaseous effluents. Catalytic oxidation may be used for control of odors, but the process requires a catalyst that will not be poisoned by particulate matter or sulfur compounds. Catalytic oxidation uses less fuel but requires a higher investment cost than thermal incineration. Odor removal by gas scrubbing with water is limited because many of the components in rendering odors are insoluble in water. Reactive scrubbing using solutions of reagents can be used, but the products of the reaction should be inert precipitates. Maintaining reagent strength, corrosion, and costs of reagents can deter use of reactive scrubbing. Ozonation, adsorption, and masking of odorous compounds can also be useful processes in odor control.

The authors suggest that further research into the following areas may be potentially beneficial: poison resistant catalysts, analytical techniques and instrumentation for identification and quantification of odor components in process streams, freezing or refrigeration of materials prior to rendering, solvent extraction as an alternative to high temperature cooking operations, and better housekeeping in plant operations.
[4 figures, 2 tables, 5 references] SW

9.2 (9.6) SYSTEMS ANALYSIS AND SIMULATION IN ECOLOGY. VOLUME II

Patten, Bernard C. (editor) (Dept. of Zoology, University of Georgia, Athens, GA 30601)
Academic Press, Inc., New York, N.Y. (1972), xvi + 529 pp. Price not given.

Volume I of this series covered ecological modeling and ecosystem simulation. In this volume II, 16 authors contributed articles in three major subdivisions. Part I is an introduction to systems science for ecologists. Part II covers steady-state analysis of energy flow in ecosystems with sensitivity analysis. Part III is theoretical in tone. It contains descriptions of an energy circuit language for ecosystems and structural properties of ecosystems. Part IV contains applications of systems analysis to fisheries problems, management and training, environmental court actions, human society, and future models in ecology. Each of these subdivisions is concluded with a bibliography, and there are author and subject indexes.

The author believes that systems science as evolved for physical systems must be joined with the subject matter and methods of traditional ecology to provide a new science of systems ecology. SW

9.3 (9.17) SCIENTIFIC ADVICE ON CATCH LEVELS

Gulland, J. A., and L. K. Boerema (Dept. of Fisheries, FAO, Rome, Italy)
Fishery Bulletin 71, No. 2, 325-335 (Apr. 1973), National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105.

The sustainable yield, or maximum sustainable yield, has been used to provide, on an objective scientific basis, target figures for the catches to be taken from a heavily exploited stock that is under regulation. The simple concept of sustainable yield does not, however, provide a completely adequate guide when the biological system is complex. Certain other quantities--the replacement yield, the sustainable yield from a stock in equilibrium, the maintainable yield, and the catch for desired harvesting rate--are defined which correspond more closely to the biological reality.

One or other of these will provide a better guide for management, depending on the nature of the divergence from the simple model. In whale populations the major divergence is the lag between changes in adult stock and changes in recruitment; replacement yield or maintainable yield are the most useful. In many fish stocks, fluctuations in year-class strength are more important: catch for desired harvesting rate may be better.
[3 figures, 2 tables, 7 references] Authors' abstract

9.2 (1.0115)(1.87) A STUDY OF THE SOCIOECONOMIC IMPACT OF CHANGES IN THE HARVESTING LABOR FORCE IN THE MAINE LOBSTER INDUSTRY

Huq, A. M. (University of Maine, Orono, ME 04473)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 159-173.

The basic question of the mobility of the labor force in the Maine lobster fishery is investigated with particular emphasis on the productivity of control groups within a sample and their social, educational, economic, and demographic characteristics. Under various assumptions which would lead to exit from the fishery of these groups certain consequences are enumerated, both with regard to those leaving and those remaining as well as the impact on and role of the local communities involved. A preliminary assessment of the impact of certain types of management programs upon the labor component of the harvesting sector is presented.
[1 figure, 13 tables] Author's abstract

9.3 THE LATIN AMERICAN APPROACH TO THE LAW OF THE SEA

Samet, Jan H., and Robert L. Fuerst (Law School, University of North Carolina)
Sea Grant Publication UNC-SG-73-08, Sea Grant Program, School of Public Health, University of North Carolina, Chapel Hill, NC 27514 (Mar. 1973), 165 pp.

In this publication the authors present and analyze the positions of the Latin American countries regarding the law of the sea. Much of the material has not previously been conveniently available. The authors present the philosophy and historical development of Latin American claims to 200-mile territorial waters; discuss the individual views and laws of most of these nations regarding the exercise of jurisdiction in the "patrimonial sea" areas contiguous to their coasts; and examine in detail the national statutes dealing with the exploration and exploitation of off-shore mineral and living marine resources. Also, they discuss the impact of Latin American thought and action on the evolving law of the sea.
[466 footnotes, 7 appendixes] FTP

9.2 (9.19) COST-BENEFIT ANALYSIS AND THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Burmeister, Edward D., Jr.
Stanford Law Review 24, 1092-1116 (June 1972)

Recent interpretations of subsections 102(2) (A)-(C) of the National Environmental Policy Act of 1969 indicate that Federal officials are required to evaluate proposed actions falling within the scope of the Act by means of cost-benefit analysis, and that environmental values be incorporated into that analysis, along with traditional economic and technical elements. Cost-benefit analyses are now required as part of the environmental impact statements prepared by the Atomic Energy Commission with regard to Federal projects the Agency licenses, and new procedures have been proposed for evaluating Federal water projects which alter the traditional cost-benefit techniques to provide for consideration of environmental factors. The present article analyzes these developments, examines the general assumptions and limitations of cost-benefit analysis, and discusses the dangers inherent in attempting to incorporate environmental values into this analytical framework.

The author concludes that the traditional model of cost-benefit analysis, with its single criterion of national income, is ill designed to achieve proper consideration of environmental factors. He believes that a multiobjective approach, similar to that proposed by the Water Resources Council for use in evaluating Federal water projects, meets many of the objections to the traditional model. Nevertheless, to insure effectiveness and good faith in Agency consideration of environmental factors, he believes it will be necessary for Congress and the Council on Environmental Quality to define classification systems, priorities, and guidelines for Federal Agency officials to follow in making the important trade off decisions involved in planning Federal projects that affect the environment.
[164 footnotes] FTP

9.3 (9.6) LAW OF THE SEA: OCEANIC RESOURCES

Jones, Erin Bain
Southern Methodist University Press, Dallas, Tex. (1972), 162 pp. Price $7.95.
Ann Van Wynen Thomas (reviewer)
Journal of Air Law and Commerce 39, No. 1, 139-140 (Winter 1973)

This book makes possible a better understanding of the complexities of the international law of the sea, its evolution, and its application to oceanic resources. It should be of interest to international lawyers, scientists, ecologists, explorers of the deep sea, and business entrepreneurs. The author first describes the advanced technology of oceanic exploitation and reviews the various laws governing oceanic areas starting from the ancient Roman era. She then traces the results of the various international conferences that have considered the law of the sea.
FTP

9.2 (9.3) ECONOMIC, POLITICAL, AND SOCIAL BARRIERS TO EFFICIENCY IN SELECTED PACIFIC COAST FISHERIES

Crutchfield, James A. (University of Washington, Seattle, Wash.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 28-38.

Multidisciplinary models are being developed for the salmon, halibut, king crab and anchovy fisheries as an aid in fisheries management. These models will provide estimates of economic rent in these fisheries, with an evaluation of alternative management structures available to capture these net benefits. The character of the models for each of these differing fisheries is described, including reference to the nature of the products, markets, processors, harvesters, regulators, stocks, and locations sectors of these fisheries. Introductory observations are made on the future role of multifishery modeling studies.
[2 figures, 6 references, appendix] Author's abstract

9.2 (9.3) PROBLEMS IN IMPLEMENTING NEW FISHERY MANAGEMENT PROGRAMS

Van Meir, Lawrence W. (National Canners Assoc., Washington, D.C.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 9-11.

The problem of fishery management raises two questions: (1) What benefits will be sought in managing fisheries and (2) to whom will the benefits accrue? Most fishery management programs remain oriented to the conservation of fish stocks with no consideration of the economic results. Common property status must be replaced by explicit fishing rights. In the process of conserving fish stocks we must bring these specific fishing rights in balance with the allowable yield of the resource in a manner that not only permits efficiency but also promotes economic efficiency and technological development. Some system must be developed to limit the amount of labor and capital employed in harvesting the allowable catch and at the same time assure that the labor and capital is used in an economically efffi-cient manner.

Even though an "optimum" management program, in an economic sense, may never be achievable in the management of commercial fisheries, changes can be initiated which will allow individual governments to realize economic gains over the status quo in harvesting common property fishery resources. These changes primarily involve jurisdictional issues; country quotas for international fisheries; accord between the Federal government and the states; and a within-industry system for allocating fishing rights. A system of vessel licensing is described with reference to the ultimate use of licenses on units of fishing effort.
Author's abstract and extracted in part

9.3 U.S. FOREIGN POLICY FOR THE 1970'S
SHAPING A DURABLE PEACE. A REPORT TO THE CONGRESS

Nixon, Richard (President of the United States)
Department of State Bulletin 68, No. 1771, 717-834 (June 4, 1973)

Card A

The following material was extracted in part from pages 825-827 of the text of the President's Report of May 3, 1973 to the Congress under "Part VII: New International Challenges," The Global Challenges of Peace (The Oceans, Territorial Seas and Straits, and Marine Resources).

As man's activities in the oceans intensify, the need for international accommodation is clear. Serious efforts are now being made in the United Nations to work out new rules and develop institutions to ensure the rational future use of the marine environment.

As a major maritime power and a leader in ocean technology, the United States has a special responsibility for this international effort to reach agreement on the peaceful use of the world's oceans. Together with more than 90 other nations, we are making intensive preparations for a comprehensive Law of the Sea Conference called for by a resolution of the United Nations General Assembly. We have introduced detailed proposals, relating to the seabed and seabed resources, living marine resources, the breadth of the territorial sea, and freedom of transit through and over international straits. These proposals are designed to accommodate the

9.3 U.S. FOREIGN POLICY FOR THE 1970'S
SHAPING A DURABLE PEACE. A REPORT OT THE CONGRESS

Nixon, Richard (President of the United States)
Department of State Bulletin 68, No. 1771, 717-834 (June 4, 1973)

Card B

resources and fisheries should be tempered by international standards that respect the interests of other states and the international community.

Internationally-agreed limitations on seabed resources should include:

--Standards to prevent unreasonable interference with other uses of the ocean, to protect the oceans from pollution, and to safeguard the integrity of investment;

--Sharing of revenues for international community purposes; and

--Compulsory third-party settlement of disputes to help reduce the potential for conflict.

We believe coastal states should have special management authority and preferential rights with regard to fisheries stocks in their coastal waters or those that spawn in their rivers. We have proposed to make these rights correspond to the biological characteristics of the fish involved. Our proposal provides for broad coastal state jurisdiction and preferences over coastal and anadromous fisheries, such as salmon, beyond the territorial sea, with international standards for conservation, maximum utilization, equitable

9.3 THE ANGLO-ICELANDIC FISHERIES DISPUTE

Bilder, Richard B. (University of Wisconsin, Madison, WI 53706)
Wisconsin Law Review 1973, No. 1, 37-132 (1973)

On Sept. 1, 1972, Iceland issued regulations to extend its fishing limits from 12 nautical miles to 50. This regulation, in effect, asserted Iceland's claim to an exclusive fisheries zone roughly to the area of its continental shelf. Both the United Kingdom and the Federal Republic of Germany protested Iceland's action and have refused to recognize Iceland's asserted fisheries limits. Furthermore, both countries have instituted proceedings against Iceland in the International Court of Justice claiming that Iceland's actions violated international law. This controversy is interesting and important for four reasons: (1) Fisheries disputes are an important and recurring source of international disputes. The Icelandic fisheries problem illustrates the nature of the claims and interests that are at stake, and suggests the potential role and limitations of international law in adjusting such disputes. (2) Iceland's extention of its fisheries limits is an example of the growing number of recent attempts by coastal states to extend their jurisdiction over broad areas of the seas for fisheries, prevention of pollution, and for other purposes. (3) The dispute occurs in the context of worldwide preparations for the United Nations Law of the Sea Conference scheduled to first convene in Nov. 1973. The Conference will undoubtedly result in some changes in the law of the sea. (4) The Icelandic problem raises important legal issues respecting the law of international agreements, the nature of international customary

9.7 CONSUMER REACTION TO NUTRITIONAL LABELS ON FOOD PRODUCTS

Lenahan, R. J., J. A. Thomas, D. A. Taylor, D. L. Call, and D. I. Padberg (Cornell University, Ithaca, NY 14850)
Journal of Consumer Affairs 7, No. 1, 1-12 (Summer 1973) (University of Wisconsin Press, Box 1379, Madison, WI 53701)

To design the most useful instruments for consumer protection, we must first understand how consumers perceive and use such instruments. We may tend to make information on labels complete as viewed by the expert rather than useful in the normal behavior of the consumer. This study was designed to determine how consumers perceive nutritional labels on food products. The study was carried out in two parts. The first part involved 2,915 interviews (a national probability sample of the population) which searched in depth the projected attitudes toward nutritional labeling. The second part was a less intensive personal interview of 4,435 shoppers in several cities in supermarkets in which a test of a nutritional labeling program was being operated.

The study was designed to find out the extent of use of the labels in the purchase decision and to determine the consumers' attitude toward the labels. The basic objectives were: (1) to determine the form of nutritional information most useful to consumers, (2) to determine the rate of perception, understanding, and use of nutritional labels in actual tests, and (3) to examine the nature and importance of nonuse benefits perceived by consumers.

The findings were: (1) The consumers favor a label format that gives nutritional values as a percent of the recommended daily allowance for the nutrient.

9.3

allocation, and compulsory third-party settlement of disputes. On the other hand, our proposal provides that highly migratory fish, such as tuna, would be regulated by international organizations in which all interested fishing and coastal states could participate. We have suggested that during the law of the sea negotiations a formula be devised to determine what part of the allowable catch is to be left to traditional distant water fisheries.

Extracted

9.3 DOCUMENTS IN THE LAW OF THE SEA (9.6)

Churchill, Robin (British Institute of International and Comparative Law), Myron Nordquist (U.S. Dept. of State), and S. Houston Lay (California Western Law School) (compilers)
British Institute of International and Comparative Law, 32 Furnival St., London EC4A 1JN (Co-published with Oceana Publications Ltd., New York, N.Y.) (Jan. 1973), 911 pp. Price £15. (two volumes). FTP

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diverse interests of many nations and to permit all to use the seas more effectively and harmoniously.

...The United States has presented to the UN Seabed Committee draft treaty articles providing for:

--a territorial sea with a maximum breadth of 12 nautical miles, together with and conditional on

--a right of free transit through and over straits used for international navigation.

We firmly believe that 12 miles represents the only figure on which general agreement among nations is possible, and there has been growing consensus on this view in the international community.

Many straits used for international navigation are less than 24 miles wide. Twelve-mile territorial seas might thus overlap. Accordingly, the United States has made a provision for a specific right of "free transit" a condition to our agreement to a 12-mile territorial sea. This would preserve the right of transit through and over international straits for ships and aircraft. The U.S. proposal is designed to accommodate the concerns of nations bordering such straits with respect to traffic arrangements and pollution control.

With respect to marine resources generally, the United States is willing to agree to broad coastal state economic jurisdiction beyond the territorial sea as part of a satisfactory overall law of the sea settlement. But this management jurisdiction over mineral

[Continued on Card B]

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(2) In the supermarket tests, about 25% of the consumers were aware of the labeling, about 15% understood the labels, and less than 10% used the labels. (3) More intensive promotion increases consumer perception, but has little effect on his understanding and use of them. (4) Consumer understanding and use of nutritional labels seem to increase with the duration of the test program. (5) Increases in nutritional knowledge and sensitivity appear associated with the duration of the nutritional labeling program. (6) Recognition of nonuse benefits is much broader among consumers than is the direct use of the nutritional labels. (7) The recognition of nonuse benefits is correlated highly with educational level and income. Nonuse benefits recognized by respondents were: (1) Nutritional information will increase consumer confidence in the food industry; (2) Manufacturers will try harder to make their products nutritious if they have to show nutritional information; (3) Nutritional labels encourage advertising that will help advance consumer education; (4) More information indicates greater concern for the consumer's welfare; and (5) Consumers have the right to know the nutritional value of market food products.

This article is a substantial condensation of the original which was published as follows:

"Consumer Reaction to Nutritional Information on Food Product Labels," Search vol. 2, no. 15, Cornell University, Ithaca, N.Y. (1972). FTP

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law, the role of the International Court of Justice, the strategy and tactics of international legal controversy, and the workings of the international legal process. This article covers the various aspects of the dispute primarily between Iceland and the United Kingdom and includes:

Background;
Diplomatic History;
The Legal Issues:
  The Validity and Effect of the International Courts Interim Order,
  The Jurisdiction of the International Court Over the Dispute: The Applicability of the Compromissory Clause in the 1961 Agreement,
  The Legality of Iceland's 50-Mile Fisheries Limits;
Other Aspects of the Dispute:
  Interrelations of the Case, the Conference, and the Parties Tactics,
  The Role of International Adjudication,
  The Role of Unilateral State Action in International Legal Change;
Prospects; and
Conclusion.
[370 footnotes] FTP

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(9.5)

DIRECTORY OF CONSUMER PROTECTION AND ENVIRONMENTAL AGENCIES

Reitman, Jerry I., and Thaddeus C. Trzyna
Academic Media, Orange, NJ 07050 (1973), Ed. 1, 627 pp.

This directory contains a list of governmental and private organizations involved in consumer and environmental protection activities in the United States. It is divided into two sections: "Consumer Protection" and "Environmental Protection." The "Consumer Protection" section includes those agencies that are concerned with the right of the consumer in the marketplace to safety, freedom of choice, adequate information, sources of redress, quality, and integrity. The "Environmental Protection" section includes those agencies that are concerned with the quality of the natural and physical environment involving problem areas of land use management, city and regional planning, preservation of wilderness and natural areas, forestry, soil conservation, water resources management and planning, air and water pollution control, marine resources, management and protection of flora and fauna, pesticides, radiation, outdoor recreation resources, population planning and control, waste management, transportation planning, noise control, nonrenewable resources, and weather modification.

The list includes all Federal Government agencies, the major State agencies, and the most important private groups. The principal agencies of the 50 largest cities in the United States are included. Organization, Personnel, Publication, and Subject indexes are included. FTP

9.7

UNIVERSITY CURRICULA IN THE MARINE SCIENCES AND RELATED FIELDS. ACADEMIC YEARS 1973-1974, 1974-1975

Anonymous
Produced by the Marine Technology Society, 1730 M Street, N.W., Washington, DC 20036 (1973), xv + 165 pp. Price not given.

This bulletin contains information on the colleges and universities that teach marine courses. It should provide invaluable assistance to students planning a career in the marine sciences and to anyone who needs up-to-date information on what academia has to offer in this field. The information was furnished by officials at each educational institution. The reports from each of these institutions are organized as follows:

A description of the facilities available, including research labs and vessels;

The degree programs in the marine field, usually with the entrance and course requirements specified;

A list of the marine courses offered and the credit given, according to each school's system;

A list of the faculty members involved with the degree programs, alphabetically and in most cases with the highest degree earned; and

The name of the contact person for further information. FTP

9.7
(9.6)

GUIDE TO LOCATING U.S. GOVERNMENT TECHNICAL INFORMATION, TECHNOLOGY AND PATENTS

Anonymous
TTA Information Services Co., P.O. Box 11977, Chicago, IL 60611 (Date and number of pages not given.) Price $15.00.
Research Management 16, No. 2, 38 (Mar. 1973)

Details of four major types of sources of government-generated technical knowledge and patents are given. These are: (1) general sources, such as the Superintendent of Documents, U.S. Government Printing Office and the Library of Congress; (2) individual agency sources, such as the National Referral Center, National Aeronautics and Space Administration, Science Information Exchange; (3) technology transfer services, including the various information and data services; and (4) patents and licenses, including a list of U.S. Patent Depository Libraries in the United States. FTP

9.8
(9.6)

ECOLOGICAL DIVERSITY

Mellanby, Kenneth (reviewer)
(1) A Natural Ecology
Michael Graham
Manchester University Press, 252 pp. £1.80
(2) Dynamic Ecology
Boyd D. Collier, George W. Cox, Albert W. Johnson, and Philip C. Miller
Prentice-Hall, 564 pp. npg
(3) Natural Environments--Studies in Theoretical and Applied Analysis
John V. Krutilla (editor)
John Hopkins University Press, 352 pp. £7.45
New Scientist 58, No. 849, 631 (June 7, 1973)

(1) The book "A Natural Ecology" is based on a series of lectures in the biology department of Salford University and deals with all the normal topics in a course on ecology.

(2) The book "Dynamic Ecology" is intended as a text for advanced students and was prepared by four members of the faculty of California State University, San Diego.

(3) The book "Natural Environments--Studies in Theoretical and Applied Analysis" is written mainly by economists. The writers attempt to extend the principles of cost-benefit analysis to studies of the natural and wilderness areas. FTP

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

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0.35 (9.19) NUCLEAR MAGNETIC RESONANCE STUDIES OF 1,1-DICHLORO-2,2-BIS(p-CHLOROPHENYL)ETHENE IN AQUEOUS PHOSPHOLIPID DISPERSIONS

Haque, R., I. J. Tinsley, and S. E. Randall (Dept. of Agricultural Chemistry and Environmental Health Sciences Center, Oregon State University, Corvallis, OR 97331)
Biochemistry 12, No. 12, 2346-2350 (June 5, 1973)

It is known that the toxicity of 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane and related compounds usually involves the nervous system. Apparently, perturbations in axonic transmission are manifested by changes in action potential that can in turn be associated with changes in ion efflux; various researchers have suggested that DDT acts by influencing the permeability of the membrane. Inasmuch as these compounds are hydrophobic in character, they might be expected to interact with the membrane lipoprotein complex. Because little information is available in this area, the authors used nuclear magnetic resonance (nmr) techniques to study the binding of DDT and related compounds with lipids. In the present study, the proton magnetic resonance spectrum of DDE was recorded in dispersions of various phospholipids in D_2O. The phospholipids included DL-α-lecithin, egg yolk lecithin, sphingomyelin, phosphatidylserine, and phosphatidylethanol amine. It was found that the ring proton spectrum of DDE showed changes in the line shape as a function of concentration of phospholipid and temperature of the solution. At higher levels of phospholipid or at higher temperatures a new peak low field to the original appeared. Similar tests with DDT did not result in such concentration and temperature

0.38 (1.92)(9.19) METABOLISM OF DIAZINON BY FISH LIVER MICROSOMES

Hogan, James W. (Fish-Pesticide Research Laboratory, U.S. Bureau of Sport Fisheries and Wildlife, Columbia, Mo.), and Charles O. Knowles
Bulletin of Environmental Contamination and Toxicology 8, No. 1, 61-64 (July 1972)

[Diazinon is the trade name of an organophosphate insecticide. Abstractor's note.] The metabolism of radioactive Diazinon (ethoxy-^{14}C-diazinon) in vitro by subcellular hepatic preparations from channel catfish was investigated. The liver preparation was incubated with the radioactive Diazinon for 2 hr. (with shaking) in a water bath at 25° C. The preparation was then separated into water and ethyl acetate soluble fractions. Diazinon and its metabolite diazoxon, in the ethyl acetate fraction, were separated by thin-layer chromatography. Water-soluble metabolites were identified by ion-exchange chromatography. Liquid scintillation spectrometry was used to identify the quantities of radioactive compounds.

The results of the experiments indicate that the metabolism of Diazinon was accomplished most actively by the microsomal fraction of the fish liver homogenate. The enzyme system in the microsomal fraction required NADPH and oxygen for the oxidative desulfuration of Diazinon to diazoxon and subsequent cleavage.
[3 tables, 9 references] SW

0.39 EGG TAINTS: ASSOCIATION WITH TRIMETHYLAMINE

Hobson-Frohock, A., D. G. Land, Nerys M. Griffiths, and R. F. Curtis (Chemistry Div., ARC Food Research Institute, Colney Lane, Norwich NOR 70F, England)
Nature 243, No. 5405, 304-305 (June 1, 1973)

A previous report indicated that brown-shelled eggs with a characteristic "fishy" or "crabby" odor were produced in various parts of the United Kingdom during late 1971 and early 1972. This problem had occurred in the same season in earlier years.

The authors examined birds from a flock that had an outbreak of tainted brown eggs. "Bad breath" is a condition associated with tainted eggs, and 20 birds with this symptom were selected for study with no change in diet. The eggs produced by this group were evaluated, and those found to be tainted were analyzed for the compounds that caused the odor. These eggs, at pH 7-8, were freeze dried, and the distillate was collected at a temperature of -198° C. The condensate was thawed, acidified to pH 3, and freeze dried. Subjecting the condensate to gas chromatography gave peaks corresponding to trimethylamine. The tainted eggs contained more than 1.0 μg. per $g.^{-1}$ of trimethylamine; untainted eggs contained less than 0.1 μg. per $g.^{-1}$. Most of the trimethylamine was in the yolk. The same birds fed a control diet produced no tainted eggs. When trimethylamine was fed to the birds, they produced tainted eggs. Fifteen year-old brown chickens with no record of producing tainted eggs were fed the control diet and then fed trimethylamine. Only two of these birds produced eggs containing 10-40 μg. per $g.^{-1}$ trimethylamine. The authors concluded that tainted eggs and bad breath are associated only with certain

0.4 "ELECTROMOTOR" RESPONSE IN THE ELECTRIC FISH EIGENMANNIA (RHAMPHICHTHYIDAE, GYMNOTOIDEI)

Heiligenberg, Walter (Dept. of Neurosciences, 1219 Ritter Hall, University of California, San Diego, La Jolla, CA 92037)
Nature 243, No. 5405, 302-304 (June 1, 1973)

The behavioral relevance of electrical signals emitted by fish was investigated. An earlier report showed that the distortion of a fish's own electrical field due to an object could be used by the fish in detection of that object. Another report indicated that a fish of the Eigenmannia genus hovers in plant thickets during the day. When placed in an aquarium without vegetation, the fish hovers in hanging bundles of plastic strips; in addition, the fish tries to maintain its relative position if the strips are gently moved. In a variation of the experiments with plastic strips, the authors suspended three Plexiglas strips vertically in the center of an aquarium so that, viewed from above, they could be imagined to be the points of a triangle with the baseline at the right and the apex at the left. Six blinded fish were tested and found to hover with the nose close to the "apex" strip and at least one side of their body near a "baseline" strip. When the strips were swung horizontally in unison, the fish maintained their positions relative to the strips. An identical arrangement was built with agar strips of electrical conductivity equal to the aquarium water. When the fish were placed in the aquarium with this arrangement, they attempted to position themselves relative to the strips. Unlike their behavior with the plastic strips, where they maintained a relative position, the fish bumped into the agar strips. When the agar

0.38 (0.6) EFFECT OF PROTEOLYTIC ENZYME PREPARATIONS ON THE QUALITY OF FROZEN FISH STUFFING

Bykova, V. M. (U.S.S.R.)
Chemical Abstracts 78, No. 7, 41727w (Feb. 19, 1973)

0.39

individual birds. At least two factors must coincide in the bird and the diet to produce trimethylamine in the eggs. Further investigations are in progress to identify the factors. The authors also state that fish meal is not involved.
[3 references] SW

0.31 (9.6) PROGRESS IN THE CHEMISTRY OF FATS AND OTHER LIPIDS. VOLUME XIII (COMPLETE)

Holman, Ralph T. (editor) (Hormel Institute, University of Minnesota, Austin, Minn.)
Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523 (June 1973), 296 pp. Price $27.00.

This volume includes the following articles:
"Spin-Labeling with Nitroxide Compounds. A New Approach to the in vivo and in vitro Study of Lipid-Protein Interaction," by W. T. Roubal.
"The Effect of Ionizing Radiation on Lipids," by W. W. Nawar.
"Odor and Flavor Compounds From Lipids," by D. A. Forss.
The book should be of interest to researchers and advanced students concerned with lipid chemistry. FTP

0.35 (9.19)

effects. DDT showed one set of resonance peaks corresponding to the crystalline phase. This behavior is probably due to the difference in hydrophobic character and in the configuration of the two chemicals. The difference in the behavior of DDT and DDE may be related to their marked difference in biological activity.
[6 figures, 2 tables, 26 references] FTP

0.4 (6.36) (9.6) MARINE PHARMACOGNOSY ACTION OF MARINE BIOTOXINS AT THE CELLULAR LEVEL

Martin, Dean F. (Dept. of Chemistry, University of South Florida, Tampa, Fla.), and George M. Padilla (Editors)
Academic Press, New York, N.Y. (1973), xii + 317 pp. Price not given.

This book brings together the present state of knowledge of the activity of selected marine drugs especially as tools in the study of cellular functions. The contributors have presented details of methods of isolation and characterization of bioactive agents, kinetics of toxin-induced hemolysis, measurement of muscle contraction, toxin-induced alterations, bioassays, and microcalorimetry. These contributions may help to extend the application of the techniques to other relevant problems in physiology, pharmacology, and other fields. Bioactive substances have been isolated from such marine animals as sponges, jellyfish, worms, snails, octopuses, lobsters, starfish, sea urchins, sea cucumbers, stingrays, scorpionfish, turtles, and snakes. Bioactive substances have also been isolated from marine plants such as bacteria, fungi, red and brown algae, and dinoflagellates. There are 19 chapters in the book relating to selected toxins and their modes of action. Each chapter has an extensive list of references. A subject and an author index are included. SW

0.4

strips were swung, the fish could not respond by maintaining a relative position and usually swam away when struck by the strips. The authors suggest that the fish perceived the plastic strips electrically rather than mechanically, and they believe that this behavior can be called an electromotor response.
[2 figures, 8 references] SW

0.39 CELLULAR HEAT INJURY

Bowler, K., C. J. Duncan, R. T. Gladwell, and T. F. Davison (University of Durham, Durham, England)
Comparative Biochemistry and Physiology 45, No. 2A, 441-450 (June 1973)

There are two widely accepted hypotheses with regard to the causes of cellular heat injury and heat death: denaturation of proteins and the "melting" of cellular lipids. There is little information available relating the temperature sensitivity of these cellular components with that of the whole animal. For example, enzymes have been found to be less sensitive to high temperature than is the cell from which they originated.

In earlier work, one of the authors reported that in the crayfish Astacus pallipes a drastic breakdown in passive permeability to sodium and potassium ions occurs early in death at 35° C. Two of the authors, in another report, found that the increase in permeability was correlated with an impairment of the bioelectric properties of muscle and with the inactivation of a membrane bound ATPase. In another earlier report, one of the authors working with the blowfly Calliphora erythrocephala found a correlation between the LD_{50} (at 40.5° C.) and loss of respiratory control and the coupling of oxidative phosphorylation by sarcosomes.

The authors suggest that cellular heat injury (and heat death) is a membrane event and may be related to the stability of lipoprotein complexes, as well as to the state of phospholipids or proteins.
[2 figures, 1 table, 35 references] SW

0.5

DEEP-SEA MICROORGANISMS: IN SITU RESPONSE TO NUTRIENT ENRICHMENT

Jannasch, Holger W., and Carl O. Wirsen (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 180, No. 4086, 641-643 (May 11, 1973)

Previously, the authors reported that mixed laboratory cultures and surface-borne marine bacteria, incubated in the deep sea, did not convert substrates actively. The authors investigated the possibility that indigenous microbial flora of the deep water or sediment may respond differently. Equipment was devised that permitted sterilized media in bottles to be inoculated directly on the sea bottom. The equipment was attached to the research submersible vessel Alvin and placed on the sea floor (1,830 m.) where it was inoculated and incubated. The site was marked and revisited by Alvin during the summer seasons of 1971 and 1972. The media contained either 0.1% starch, 0.033% agar, or 0.1% gelatin. Other media contained 0.01% KH_2PO_4 plus K_2HPO_4 and 0.025% NH_4Cl. After the incubation period of several seasons, the bottles were retrieved and poisoned (exposed to mercuric chloride [$HgCl_2$]). Starch, agar, and gelatin concentrations in the media were measured to determine if these substances had been consumed in metabolic activity. Sterile samples of balsa and beech wood, paper, and thalli of marine algae were also subjected to possible use as a substrate in a similar manner. Sterile controls were kept for the same period at the approximate deep-sea temperature of 3°-4° C. Using the same inoculation and incubation procedure, isotopically labeled mannitol, sodium acetate, sodium glutamate, and casamino acids in various concentrations were deposited on the sea floor and maintained for 14 weeks. In a duplicate set, the

0.5
(2.9)(3.5)

BACTERIAL PRODUCTION OF DI-METHYL NITROSAMINE IN SALTED FISH

Fong, Y. Y. (Dept. of Biochemistry), and W. C. Chan (Dept. of Pathology, University of Hong Kong, Hong Kong)
Nature 243, No. 5407, 421-422 (June 15, 1973)

In earlier work, the senior author and his colleague demonstrated the presence of di-methyl nitrosamine (DMNA) and di-ethyl nitrosamine (DENA) in appreciable quantities in Chinese salted marine fish from markets in Hong Kong. These compounds were produced from the action of bacteria on the nitrate in the crude salt used to prepare the salted fish. Viable cultures on salt agar were obtained of nitrate reducing Staphylococcus aureus and halobacteria. In the present study, the authors found that this particular S. aureus was instrumental in increasing the DMNA content of fish broth.

Homogenized Chinese salted fish was divided into three equal portions. One portion was sterilized by heating it in a water bath at 70° C. for 1 hr. daily. The second portion was heated in a similar manner and then was inoculated with the S. aureus. The third portion was left untreated. The portions were incubated at 37° C. and analyzed for DMNA content on day 0, 1, 2, 3, 5, and 7. The nitrate content of the original homogenized fish broth was 40 p.p.m.; the nitrite content, 5 p.p.m.; and the DMNA content, about 0.1 p.p.m.

The sterilized fish broth showed no change in DMNA content. The untreated and the inoculated fish broths showed progressive increases in DMNA content, with the rise in DMNA content of the former lagging 1 day behind the latter. The DMNA content of the inoculated broth on the 7th day was just a little over 0.6 p.p.m.,

0.5
(2.05)

INTERACTING EFFECTS OF pH, TEMPERATURE, AND SALT CONCENTRATION ON GROWTH AND SURVIVAL OF VIBRIO PARAHAEMOLYTICUS

Beuchat, L. R. (Dept. of Food Science, University of Georgia Agricultural Experiment Station, Experiment, GA 30212)
Applied Microbiology 25, No. 5, 844-846 (May 1973)

Previous workers demonstrated that V. parahaemolyticus would grow at 22° and 42° C., at pH 5 to 11, and at NaCl levels of 1 to 7%. The purpose of the present study was to establish the minimal pH values at which the organism would grow in an artificial, liquid medium. Six strains of V. parahaemolyticus were tested. Trypticase-soy-broth containing 3% or 7% NaCl was used. Data for three of the strains of V. parahaemolyticus used are shown in the table that follows. Growth occurred at pH 4.8 and at 5° C. The author cautions that these data were derived by use of liquid media and that results in food products or other natural substrates may be different. He believes, however, that the data should be useful when checking for the causative organism in foodborne outbreaks where V. parahaemolyticus is suspect.

[1 figure, 1 table, 5 references] FTP

0.5
(2.05)

EVALUATION OF POTENTIAL RISK OF BOTULISM FROM SEAFOOD COCKTAILS

Lerke, Peter (G. W. Hooper Foundation, Laboratory for Research in the Canning Industries, 1950 Sixth Street, Berkeley, CA 94710)
Applied Microbiology 25, No. 5, 807-810 (May 1973)

Although seafood cocktails have not been implicated in cases of botulism, experimental evidence as to their safety has not yet been established. This study was carried out to assess the risks of botulism from seafood cocktails.

Thirty-five samples of commercial seafood (crab, shrimp, lobster, or fish) cocktails ranged in pH from 4.10 to 4.85, and none of them showed detectable Clostridium botulinum E. At 30° C., toxinogenesis in homogenates of crab meat inoculated with 10,000 spores of C. botulinum E and acidified with a citric-acetic acid mixture was prevented at pH 4.86 or lower; for homogenates of shrimp, under the same conditions, toxinogenesis was prevented at pH 5.03 or lower. To insure the safety of seafood cocktails the author recommends two requirements for preparation of the products: (1) The initial pH of the sauce should be no higher than 3.70, and (2) as soon as possible after the product is prepared, it should be chilled to at least 10° C. and held refrigerated for 24 hr. These recommendations are based on the results of tests on acid penetration into the centers of large pieces of seafood.

[4 tables, 10 references] FTP

0.5 (2.05)

Strain of *Vibrio parahaemolyticus* [1]	Temperature	Minimum pH for growth of the organism			
		In 3% NaCl, TSB [2]		In 7% NaCl, TSB [2]	
		Moderate growth	Extensive growth	Moderate growth	Extensive growth
	0° C.				
	5	7.7	--	7.6	--
	9	7.5	7.8	7.3	7.7
8700	13	5.2	5.6	6.0	6.1
	21	4.9	5.1	5.6	5.7
	30	4.8	5.2	5.3	5.4
	5	7.3	--	7.3	--
	9	7.1	7.6	7.3	7.7
0	13	5.2	5.6	5.5	6.0
	21	5.0	5.4	5.1	5.4
	30	5.0	5.1	5.0	5.3
	5	7.7	--	7.5	--
	9	7.7	7.8	7.3	7.8
4750	13	5.6	5.8	5.7	5.9
	21	5.4	5.5	5.4	5.5
	30	5.1	5.2	5.0	5.2

[1] Other strains reported in the original manuscript were: 107914, 284-72, and T-3765-1.

[2] TSB = Trypticase-soy-broth.

FTP

0.6 CONVERSION AND MANUFACTURE OF FOODSTUFFS BY MICROORGANISMS
(0.5)(9.6)

Anonymous
Saikon Publishing Co., Tokyo, Japan (1972), 297 pp. Price not given.
Food Manufacture 48, No. 5, 40 (May 1973)

This book contains all the papers and discussions, in English, presented at the Proceedings of the Sixth International Symposium of IUFoST held in Kyoto, Japan, in December 1971. The main section titles are: "Microbial Enzymes and Their Application to Food Processing," "Traditional Foods," and "Modern Microbial Foods." A list of participants in the symposium is provided. SW

0.5

samples were inoculated at a depth of 200 m. and incubated at a depth of 1,830 m. The degree of substrate conversion to cell material and CO_2 was measured by liquid scintillation spectrophotometry.

The results indicated that the enrichment of deep-sea water and sediment with various organic substrates did not increase the activity of the indigenous microflora within 1 year of incubation. There were no changes in the paper, wood, or algal samples. Inocula at 200 m. did not show activity on isotopic labeled substrates incubated at 1,830 m. for 14 weeks. The authors suggest that because the deep-sea bottom is devoid of organic matter available as a substrate, the activity of microorganisms in the deep sea may be confined to the intestinal tracts of animals. [1 figure, 2 tables, 11 references] SW

0.5 (2.9)(3.5)

and that of the untreated fish broth was about 0.5 p.p.m. Apparently, then, the DMNA content of fish would be dependent upon storage condition, degree of contamination by nitrate-reducing bacteria, and the amount of precursors present. [1 figure, 8 references] FTP

0.5 PREDOMINANT AEROBIC BACTERIA OF FISH AND SHELLFISH
(7.86)(8.8)

Lewis, D. H. (Dept. of Veterinary Microbiology)
Sea Grant Publication TAMU-SG-73-401, Sea Grant College, Texas A & M University, College Station, TX 77840. (May 1973), 102 pp.

This report contains information on determinative outlines, methods, and materials (including media) for classifying the majority of the aerobic, heterotrophic bacteria associated with fish and shellfish. Included, also, are methods for analysis for nucleic acid base ratio and a computer program for numerical taxonomy. FTP
[7 figures, 141 references]

0.6 PROBLEMS IN THE PRODUCTION OF SEMIPRESERVED FISH

Meyer, V. (Bundesforschungsanst. Fisch., Hamburg, Germany)
Chemical Abstracts 78, No. 11, 70256x (Mar. 19, 1973)

0.7 (6.190) DETERMINATION OF THE METABOLIC FAECAL NITROGEN AND THE ENDOGENOUS URINARY NITROGEN ON MINK

Hansen, N. Glem, and G. Jørgensen (National Research Institute of Animal Nutrition, Experimental Fur Farm, Hillerød, Denmark)
Acta Agriculturae Scandinavica 23, 34-38 (1973)

The determination of the biological value (BV) of protein for maintenance and growth [K. Thomas, Arch. Anat. Physiol. Abt.: 219 (1909) and H. H. Mitchell, J. Biol. Chem. 58, 873 (1924)] is used with rats and other species of domestic animals. The equation for the calculation of BV depends upon the values for metabolic fecal nitrogen (metabolic N) and endogenous urinary nitrogen (endogenous N); these values cannot be determined directly in a single experiment. This article reports on the adaptation of the Thomas-Mitchell method to mink. One hundred and thirteen nitrogen balance tests were carried out to determine the influence of nitrogen intake, body weight, weight increment, age, and dry matter intake on the amount of metabolic N and endogenous N in mink. Multiple regression analyses indicated that all these parameters significantly influenced the metabolic N and the endogenous N. Multiple regression equations for the calculation of metabolic N and endogenous N are:

Metabolic N = 0.26 - (kg. body weight × 0.075) - (gram weight gain × 0.00025) + (age in weeks × 0.004) + g. dry matter consumed × 0.0004).

Endogenous N = 0.02 + (kg. body weight × 0.08) - (gram weight gain × 0.00054) + (age in weeks × 0.00377) - (gram dry matter × 0.00085).

[3 figures, 4 tables, 14 references] FTP

0.8 OCEAN TEMPERATURE GRADIENTS: SOLAR POWER FROM THE SEA

Metz, William D.
Science 180, No. 4092, 1266-1267 (June 22, 1973)

The temperature of the surface of the ocean lying between the Tropic of Cancer and the Tropic of Capricorn remains constantly at 25° C. Due to the equilibrium between the heat collected from sunlight and the heat lost by evaporation and other processes, the warm water moves toward the poles, and the cold water at the poles sinks into the depths and moves toward the Equator. In the tropics, this cold water is located 1,000 m. from the surface and, at a temperature of 5° C., provides a heat sink. This temperature differential can be used to generate electricity. The concept originated with the French physicist Jacques D'Arsonval in 1881 and is now being investigated by researchers in the United States. One of these studies was based on a design of a submerged power plant with a practical efficiency of 2 to 3%. In this plant, the 25° C. (hot) water would flow through a heat exchanger where it would cause the "working fluid," such as ammonia, to boil. The vapor (or steam) from the boiling working fluid would drive a turbine and then be condensed back to the fluid state in a condenser cooled by cold (5° C.) sea water. The energy derived from this temperature differential would be the same as the energy potential of a hydroelectric plant with a pressure differential corresponding to 93 ft. of elevation. Such a power plant is projected to cost very little more than conventional power plants because the sea acts as a medium for collecting sunlight and storing energy. In addition, the hydrostatic pressure of the sea against the submerged system would permit the walls of the pressure vessels to be quite thin,

0.8 HOW THE ENERGY CRISIS WILL SPUR OCEAN-RELATED ACTIVITIES

La Motte, Clyde
Ocean Industry 8, No. 6, 75-76 (June 1973)

The energy crisis is going to cause a vast increase in ocean-related activities. One of the indicators of this predicted increase is the President's message on energy to the Congress which calls for tripling the amount of offshore acreage to be offered annually for oil exploration between now and 1979. There will be a corresponding increase in the numbers of offshore drilling platforms, drill pipe, service boats, helicopters, pipe lines, and other equipment. The areas of increased activity include the Gulf of Mexico, the Gulf of Alaska, and the Atlantic and California shorelines.

In addition to the oil searches on the coasts, imports of petroleum from overseas will increase and will be carried in larger tankers. The daily worldwide movement of petroleum over water in 1972 totaled 29 million barrels (information from the National Petroleum Council, Dept. of the Interior). The United States is now dependent on foreign sources for 30% of its oil needs. By 1985 this dependence is expected to increase to 50% of its needs. Natural gas (liquified) is also anticipated to be shipped to the United States in 1985 at the rate of 90 million barrels annually in highly specialized vessels. Facilities for receiving such quantities will have to be constructed in the United States. The President recommended the construction of new deepwater ports. Use of smaller vessels (30,000 dwt) requiring 18,000 annual ship calls will increase port congestion and the opportunity for accidents. Optimally sized ships of 250,000 dwt would reduce transportation costs, and annual port activity would be reduced to 3,000 ship calls.

0.9 VALUE OF DRIED CATTLE MANURE AS A FEEDSTUFF FOR POULTRY

Lipstein, Bianka, and S. Bornstein (Division of Poultry Science, Agricultural Research Organization, The Volcani Center, Bet Dagan, Israel)
Feedstuffs 45, No. 24, 22-23, 30 (June 11, 1973)

The purpose of this study was to determine (1) the effects of diets containing dried cattle manure (DCM) on the well-being and performance of growing and of laying chickens and (2) the utilization of the energy and the nitrogen of DCM by these chickens. The DCM was obtained from a drying plant and apparently was produced under rather primitive drying methods. The DCM was substituted in the rations in different amounts, up to 30%, for sorghum grain or for pulverized basalt rock.

DCM did not seem to have any caloric value for growing chickens, but its metabolizable energy content was estimated at about 500 kcal./kg. for laying chickens. Apparent retention of nitrogen from DCM was low. DCM, therefore, is an unsuitable dietary ingredient from the standpoint of its nutritive contribution to chickens, unless the purpose of its addition is to lower nutrient density. Data on the composition of DCM are shown in the table that follows.

0.8

because the outside pressure would be balanced by the internal pressure. Not only could electricity be generated, but the system could also produce fresh water through condensation of the warm water vapor by the flow of cold water. Another possibility is the use of the nutrients in the cold water for aquaculture projects such as algae, crustaceans, and shellfish culture. More study is needed to improve designs and make cost estimates more accurate, but solar power may become a source of clean energy in the future.
[1 figure] SW

Shifrin, S. M., I. B. Peenson, and A. N. Zabbarov (U.S.S.R.)
Chemical Abstracts 78, No. 24, 151286j (June 18, 1973)

0.8 REMOVAL OF FAT AND SUSPENDED MATTER FROM WASTE WATERS
(9.19) OF FISH-CANNING ENTERPRISES

0.8 WATER QUALITY: MANAGEMENT AND POLLUTION CONTROL PROBLEMS
(9.19)(9.6)

Jenkins, S. H. (editor)
Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523 (Apr. 1973), 368 pp. Price $24.00.

This book contains the proceedings of the 6th Conference of the International Association on Water Pollution Research held in Jerusalem in June 1972. The sessions dealt with subjects such as water pollution control programs, education and training for water pollution control, quality criteria of wastewater, behavior of certain pollutants in aqueous systems, sanitation, wastewater treatment, and corrosion in collection systems. The book should be of interest to engineers, chemists educators, and administrators concerned with water quality. FTP

0.9

Item	Composition of dried cattle manure	
	Sample 1	Sample 2
Moisture (%)	7.9	9.4
Crude protein (N x 6.25) (%)	12.4	11.6
Crude fat (%)	1.6	2.0
Fiber (%)	23.5	20.7
Ash (%)	26.1	31.0
Calcium (%)	2.3	2.8
Phosphorus (%)	0.7	0.7
NaCl (%)	2.2	1.5
N.F.E. (%)	28.5	25.3
Gross energy (cal./g.)	3.05	2.92
Specific gravity (g./ml.)	0.36	0.36

[3 figures, 3 tables, 18 references] FTP

0.8

Another possible ocean-related activity that would be new would involve construction of power plants in offshore locations. The author recommends that jurisdiction to prescribe standards regarding marine pollution should be vested exclusively in international organizations. With regard to seabed pollution caused by local operations, jurisdiction to prescribe standards for control should be vested in the adjacent country, with international standards as the final standard. SW

0.9 PROCEEDINGS: FOURTH NATIONAL SEA GRANT CONFERENCE
(6.0)

Sea Grant Publication WIS-SG-72-112, University of Wisconsin, Madison, WI 53706 (1972), 248 pp. Available from the Sea Grant Communications Office, 1225 West Dayton St., University of Wisconsin, Madison, WI 53706)

This bulletin reports some of the material presented at the fourth conference of the Association of Sea Grant Program Institutions. It contains 5 addresses and 27 reports of the various sessions dealing with aquaculture, advisory services, coastal zone management, legal-economic aspects of the fisheries, ocean engineering, marine resources education, and economics. A list of the names and addresses of the 199 participants is given. FTP

1.0158 (1.0152) (1.0153) GENERAL REVIEW OF THE TRAWL FISHERY AND THE DEMERSAL FISH STOCKS OF THE SOUTH CHINA SEA

Shindo, Shigeaki (Tokai Regional Fisheries Research Laboratory, Tokyo, Japan)
FAO Fisheries Technical Paper No. 120, Food and Agriculture Organization of the United Nations, Rome, Italy (Apr. 1973), v + 49 pp. (Distribution restricted)

The South China Sea (Nan Hai in Chinese) is a part of the Pacific Ocean bordered on the west by the Asian coast, the southern edge of the Gulf of Thailand, and the east coast of the Malay Peninsula. The South China Sea is bordered on the south by the islands of Sumtra and Borneo. The northern boundary coincides with the waters between the northern tip of Taiwan and the Province of Fukien on the coast of Mainland China.

The landings of fish in the tropical and temperate zones of the sea are composed of many species in contrast to the fewer dominant species caught in polar areas. In the catch statistics gathered through several years of the fisheries, the following species predominated: conger pike eel, Muraenesox cinereus; croakers, Sciaenidae; golden threads, Nemipterus spp.; pony fishes, Leiognathidae; horse mackerel, Caragidae; and wolf fishes, Chirocentridae.

According to the fish stock evaluation presented in the review, the demersal fish stocks on the Mainland Shelf have been intensively exploited. A further increase in the fishing effort is not recommended. The Sunda Shelf is bordered by Vietnam on the north, Borneo on the east, and the Malay Peninsula on the south. With the exception of the Gulf of Thailand, the demersal stocks of the Sunda Shelf

1.36 (9.19) RECENT CHANGES IN ATLANTIC SALMON (SALMO SALAR) RUNS IN THE LIGHT OF ENVIRONMENTAL CHANGES IN THE SAINT JOHN RIVER, NEW BRUNSWICK, CANADA

Dominy, C. Leslie (Environment Protection Service, P.O. Box 5667, St. John's Newfoundland, Canada)
Biological Conservation 5, No. 2, 105-113 (Apr. 1973)

The waters of the Saint John River basin are used for various purposes, some of which are in direct conflict with each other. The major uses of water in the river are for waste disposal from industries, municipalities, and hydroelectric power, and as a water supply for the same groups. Deterioration of water quality has increased substantially over the past two decades. The biological assimilative capacity of the river has been reduced by untreated organic and toxic wastes, and by hydroelectric power developments. The effects of these changes on the Atlantic salmon have been to reduce the quality of its migration route to and from the sea, eliminate some of its spawning and rearing areas, and cause direct mortality of adults and juveniles. Consequently, the total salmon stock in the river has declined about 40% over the past 20 years. In view of government activities in comprehensive planning for water resources, water quality management to reduce pollution, and improved fishery management on the Saint John River, future prospects for conserving its salmon resource are moderately bright.
[5 figures, 3 tables, 13 references] SW

2.1474 (2.6) TRAP-NET DEMONSTRATION AND MARKETING SURVEY RAINY LAKE

Thomson, R. T. (Fort Frances District)
Commercial Fish and Fur Branch, Division of Fish and Wildlife, Ministry of Natural Resources, Ontario, Canada (1972), 14 pp.

Under the ice, trap nets are used for harvesting crappie in Rainy Lake, Ontario. However, other fish, such as burbot (Lota lota), are abundant in the lake and trap net fishing might be an efficient method for their harvest. Therefore, a demonstration was carried out for the commercial fishermen on the use of the trap net for harvesting the burbot. In addition, to encourage the utilization of burbot, a survey was made on the acceptability and marketability of the product. This bulletin reports the results of the demonstration and survey. The setting of the trap net under ice is briefly described. The figure that follows shows the arrangement of the trap net in place in the lake under the ice. The acceptance of the product by consumers was generally favorable.
[3 figures, 2 references, appendix] FTP

2.1477 (2.1473) (1.017) REPORT ON THE INVESTIGATIONS OF THE 'LLORET LOPEZ II' 8 JANUARY TO APRIL 1970. SECTION 4 POLEFISHING AND TROLLING METHOD; SECTION 5 LONGLINING METHOD

Webb, B. F. (Fisheries Division, Marine Dept., Wellington, New Zealand)
Fisheries Technical Report No. 105, New Zealand Ministry of Agriculture and Fisheries, Wellington, New Zealand (1973), 38 pp.

Section 4.--Polefishing for tuna is described, with modifications for New Zealand conditions. The equipment needed and the technique used are illustrated by photographs and diagrams. A description is given for a polefishing vessel.

Section 5.--Longlining for tuna is described. Descriptions and illustrations of the gear, with modifications for New Zealand conditions, and of the method are given. A 35-38 m. vessel was considered best suited to the New Zealand area conditions. [14 figures, 23 illustrations, 9 references] FTP

1.4 [THE REDFISH SEBASTES MARINUS SPECIES. FISHERY, BIOLOGY, EXPLOITATION] LE SEBASTE, SEBASTES MARINUS SP. LIEUX DE PÊCHE, BIOLOGIE EXPLOITATION

Hamon, P. Y. (Lab. ISTPM, St. Pierre et Miquelon, France)
Rev. Trav. Inst. Pêches Marit., Nantes, France 36, No. 3, 337-352 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 4, 247, Abstract No. 3Q4316M (Apr. 1973)

The term 'redfish' includes four different species: Sebastes marinus mentalla, S. m. marinus, S. viviparus, and Helicolenus dactylopterus. The biology, distribution, and exploitation of the first two species are presented. These fish are widely distributed over the North Atlantic Ocean. The following coastal areas are described in detail: Labrador, Newfoundland, Cape Breton, Nova Scotia, Gulf of St. Lawrence, Georgia Bank, and Nantucket. The biology of the redfish is described and includes parasites, nutrition, and relationship to other species. Details of productivity, catches and export, and the state of the stock are given. If the stocks are not depleted, the young population of the St. Pierre Bank will be very important in a few years. SW

1.9 (1.0119) THE COMMERCIAL FISHERY FOR AMERICAN EEL, ANGUILLA ROSTRATA (LESUEUR), IN LAKE ONTARIO

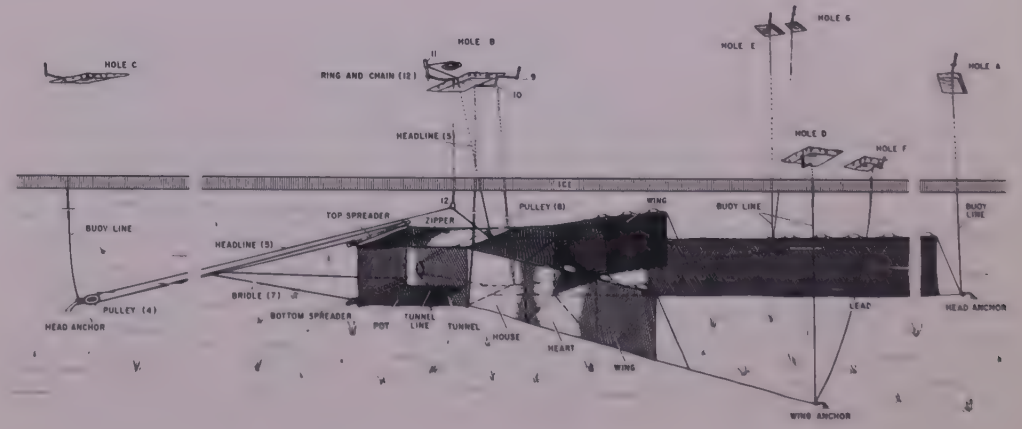
Hurley, Donal A. (Ontario Ministry of Natural Resources, Maple, Ontario, Canada)
Transactions of the American Fisheries Society 102, No. 2, 369-377 (Apr. 1973)

In the late 1950's the American eel was a nuisance because it destroyed fish caught in gill nets, damaged the nets, and was low in commercial value. Increased consumer demand (in North America and Europe) forced the price of eels up, and, in the 1960's, they became an additional source of income when the stocks of other lake fish were declining. Most eels are caught by baited hooks on set lines which are placed over distances of up to a mile and are buoyed in about 25 ft. of water. Hoop nets and trap nets are used in shallow water. Set lines were used to catch 61% of the annual catch; hoop nets were used to catch 27% and trap nets about 7%. Seines were used by a few fishermen and these catches have been substantial. Since 1959, landings of eel by Canadian fishermen have ranged between 108,000 and 241,000 lb. These catches have been 70% to 90% of the total eel catch and are the only statistics mentioned in the article. The peak catch occurred in 1964. Since then the recent annual catches have been about 160,000 lb. Since the late 1950's, eel stocks have been exposed to two hazards: increased fishing pressure and the Moses-Saunder hydroelectric dam. A decrease in the catch of large eels (900 to 1,000 mm. length) is attributed to increased fishing pressure. The total catch was maintained by an increase in the numbers of small eels (500, 600, and 700 mm. length) taken. Hoop nets caught the largest eels and set lines, the smallest. Completion of the dam across the St. Lawrence River has not completely prevented migration of eel into and out of Lake Ontario; the dam either holds back or prevents a proportion of the eels from entering the lake. How these eels enter the lake is not known. [2 figures, 8 tables, 5 references] SW

1.0158 (1.0152)(1.0153)

are relatively underutilized. Further expansion of fishing intensity may be possible. In the Gulf of Thailand, the stocks are now overfished, and management action without delay is recommended to protect the demersal fish resource. There are many areas in the South China Sea which have banks, reefs, and rocky bottoms that are unsuitable for trawls. Most of these grounds are in a virgin state; the north coasts of Borneo and Palawan are examples. Bottom longline or vertical line gear is useful in such areas.
[6 figures, 25 tables, 46 references] SW

2.1474 (2.6)



Arrangement of the trap net in place under the ice.

2.8 ACCEPTANCE OF PRECOOKED FROZEN CHICKEN REHEATED BY MICROWAVE ENERGY

Sison, E. C., L. E. Dawson, and Elizabeth Payne (Dept. of Food Science and Human Nutrition, Michigan State University, East Lansing, MI 48823)
Poultry Science 52, No. 1, 28-34 (Jan. 1973)

Chicken pieces were breaded and then precooked under pressure in corn oil. The precooked pieces of breaded chicken were frozen using air blast (-37° C.), nitrogen (-57° C.), or Freon-12 (-43° C.), packaged in polyethylene bags, and then stored at -18° C. for up to 6 months. To test the acceptance of the chicken, the frozen pieces were reheated in a microwave oven for 1.5 to 2.0 min. per piece (or 1 min. per 100 g.) and evaluated by a taste panel.

Apparently, microwave energy is a rapid method for thawing and reheating precooked and frozen chicken. The optimum reheating period is 1 min. per 100 g. of product. The precooked frozen breaded chicken parts were acceptable for more than 4 months when stored at -18° C. Rapid freezing rates (using nitrogen or Freon-12) did not enhance the acceptability of the product over that frozen in air at -37° C. [4 figures, 4 tables, 20 references] FTP

4.11 (4.92)(0.7) NOVEL METHODS FOR EVALUATING DETERIORATION AND NUTRITIVE VALUE OF OXIDIZED OIL

Akiya, Toshimi, Chuji Araki, and Kiyoko Igarashi (National Food Research Institute, Shinjo Branch, 4-19 Ishikawa-cho, Shinjo-shi, Yamagata-ken 996, Japan)
Lipids 8, No. 6, 348-352 (June 1973)

Several methods for estimating the toxicity of deteriorated fats and oils were tested. Peroxide value provides little indication of the toxicity of an oxidized oil, because some of the decomposition products of peroxides are also toxic. Also, peroxides are destroyed by heat, and frying fats, for example, may show low peroxide values even though they may be highly deteriorated. In the present tests, soybean oil with peroxide values of 10, 110, 180, and 380 and rapeseed oil with a peroxide value of 180 were used. The chicken embryo test of T. Miura, M. Tsuchiya, and K. Miyaki was found to be sensitive and to give reproducible results in evaluating the toxicity of the oxidized oils. In this test, 0.2 ml. of the oil is injected into the yolk sac of each of 10 eggs, and the eggs are then incubated at 38° C. and 68% relative humidity. An estimate of the toxicity of the oils is made on the basis of the mortality of the embryos after 24, 48, and 72 hr. of incubation. The chicken embryo test gave results equivalent to those based on the measurement of growth rate of weanling rats or mice fed deteriorated oils. An enzyme test using alkaline phosphatase showed some promise for estimating toxicity of oxidized oils. The reduction of the enzyme activity was used as a measure of the toxicity of the oil added to the enzyme substrate.
[3 figures, 5 tables, 15 references] FTP

3. (9.6) THE ALMANAC OF THE CANNING, FREEZING, PRESERVING INDUSTRIES

Anonymous
The Almanac, P.O. Box 866, Westminster, MD 21157 (1973), 58th edition. Price US$12.50.

The Almanac contains information on personnel, food laws, labeling and packaging, standards, grades, statistics, prices, international trade, and buyers guide for machinery, supplies, and services. The 1973 edition contains the latest information on nutrition labeling regulations and on the good manufacturing practices for processing low acid foods. FTP

4.6 (2.8) POLYMERIZATION INHIBITORS FOR POLYUNSATURATED OILS

Sims, R. J., J. A. Fioriti, and M. J. Kanuk (General Foods Corporation, Technical Center, White Plains, NY 10625)
Lipids 8, No. 6, 337-341 (June 1973)

Methyl polysiloxane is used in frying oils to inhibit oxidative polymerization. It is functional at levels below 1 p.p.m. It probably forms a protective film at the oil-air interface thus limiting access to oxygen. In this study, several edible anionic surfactants were found to function as polymerization inhibitors for safflower oil. The most effective was the sodium salt of mono- and diglycerides. Other inhibitors included: sodium diacetyltartaric acid esters of mono- and diglycerides, sodium stearoyl-2-lactylate, sodium stearyl fumarate, sodium succinoylated mono- and diglycerides, dioctyl sodium sulfosuccinate, and sodium sulfoacetate esters of mono- and diglycerides. The authors believe that these surfactants perform in a similar manner to methyl polysiloxane.
[2 figures, 4 tables, 6 references] FTP

3.5 (1.9) SAND- AND TIN-SALTED FISH. MUGIL CEPHALUS

Elmossalami, E., and M. F. Sedik (Fac. Vet. Med., Cairo Univ., Cairo, United Arab Republic)
Chemical Abstracts 78, No. 9, 56615g (Mar. 5, 1973)

3.337 (0.8) ESTIMATION OF PROCESS CONDITIONS FOR CONTINUOUS STERILIZATION OF FOODS CONTAINING PARTICULATES

De Ruyter, P. W. (Food Research and Development Dept., John Labatt Ltd., P.O. Box 6089, Montreal 101, Quebec, Canada), and R. Brunet (Dept. of Mathematics, University of Montreal, Montreal, Quebec, Canada)
Food Technology 27, No. 7, 44-46, 48, 50-51 (July 1973)

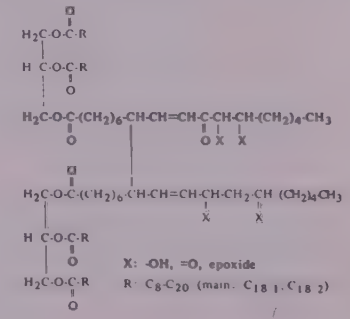
There are two basic problems involved in the aseptically canning of food products containing particulate material. These are (1) providing a mechanical means of physically handling the products in a continuous heat/hold/cool/fill operation while maintaining proper distribution and integrity of the food particles, and (2) making certain of the commercial sterilization of the entire particle, at the same time taking advantage of the high-temperature/short-time process for maximum preservation of other qualities of the product. This article gives a method for estimating the process conditions, in a scraped-surface heat exchanger, required for the continuous sterilization of foods, containing particulate material, that are to be aseptically packaged. The authors derive the appropriate equations and discuss development of the computer program.
[4 figures, 1 table, 5 references]

FTP

4.5 (4.92) CHARACTERIZATION OF TOXIC COMPOUND IN THERMALLY OXIDIZED OIL

Ohfuji, Takehiko, and Takashi Kaneda (Dept. of Food Chemistry, Tohoku University, Sendai, Japan)
Lipids 8, No. 6, 353-359 (June 1973)

In preliminary tests, the authors evaluated the toxicity to rats of polymerized soybean oils. The soybean oil was heated at 275° C. for 12 hr. in the presence of N_2 (thermally polymerized oil) or in the presence of air (oxidatively polymerized oil). The oxidatively polymerized oil retarded weight gain of rats more than did the thermally polymerized oil. By means of column chromatography and elution with ether, the authors were able to isolate a highly toxic dimeric material from the oxidatively polymerized oil. Although this dimeric fraction probably contained a large number of different chemical entities, a substantial part of it consisted of molecules of the following type:



[5 figures, 7 tables, 13 references]

FTP

2.8 (4.91)(0.6) LIPID CHANGES IN EGG YOLKS AND CAKES BAKED IN MICROWAVE OVENS

Schiller, Elizabeth Ann, Dan E. Pratt, and Elwood F. Reber (Dept. of Foods and Nutrition, Purdue University, West Lafayette, IN 47906)
Journal of the American Dietetic Association 62, No. 5, 529-533 (May 1973)

Samples (50 g. each) of egg yolk, with and without added linoleic acid, were cooked (to 80° C.) by three methods: (1) in a conventional electric oven at 190° C., (2) in a microwave oven operating at 915 MHz, and (3) in a microwave oven operating at 2,450 MHz. After the egg yolk samples were cooked, they were blended with an equal amount of water and the lipids were extracted. Then, the dried extractants were analyzed for fatty acid content. TBA (thiobarbituric acid) values were also determined to serve as an indicator of the degree of oxidation of the lipids.

The fatty acid composition did not change and there was no measurable decrease in polyunsaturated fatty acids as a result of any of the three heat treatments. The egg yolk samples heated in the conventional oven did show higher levels of lipid oxidation. The level of oxidation of the lipids in the egg yolks heated by microwaves at 2,450 MHz were higher than that of the samples heated at 915 MHz. Apparently microwaves do not interact strongly with lipid molecules.
[6 tables, 14 references]

FTP

4.13 (8.53) LIPIDS IN COMMERCIAL BALTIC SEA FISH. I. LIPID FRACTIONS OF MUSCLE TISSUE

Podeszewski, Zbigniew, Barbara Otto, and Halina Parfianowicz (Inst. Technol. Przetworstwa Rybn., Wyzsza Szk. Roln. Szczecin, Poland)
Chemical Abstracts 78, No. 7, 41749e (Feb. 19, 1973)

4.13 (4.2) LIPIDS IN COMMERCIAL BALTIC SEA FISH. II. FATTY ACIDS OF LIPID FRACTIONS

Stodolnik, Ludmila, and Zbigniew Podeszewski (Inst. Technol. Przetworstwa Rybn., Wyzsza Szk. Roln., Szczecin, Poland)
Chemical Abstracts 78, No. 7, 41750y (Feb. 19, 1973)

4.9 (0.4) EXACERBATION OF HEART AND LIVER LESIONS IN RATS BY FEEDING OF VARIOUS MILDLY OXIDIZED FATS

Kaunitz, Hans, and Ruth E. Johnson (Dept. of Pathology, Columbia University, New York, NY 10032)
Lipids 8, No. 6, 329-336 (June 1973)

In an earlier test carried out in the authors' laboratory, rats on a low iodine diet were fed eight fresh and mildly oxidized vegetable and animal fats. The average life span of the rats fed fresh vegetable oils was shorter than those fed fresh animal fats, and, also, rats fed the oxidized forms of three of the oils (olive, corn, and soybean) showed longer life spans. There was some indication that the fats exerted other effects that were not related to their fatty acid composition; it was theorized that fats (particularly vegetable oils) may contain biologically active substances in their nontriglyceride fractions that exert long-term effects. The present paper reports on a more comprehensive study using large groups of rats.

Charles River rats were fed diets containing cottonseed oil, corn oil, soybean oil, coconut oil, chicken fat, beef fat, butter oil, lard, and saturated medium chain triglycerides. The fats were used fresh and also after they were aerated at 60° C. for 40 hr. (This process barely changed the peroxide values of the fats.). Also, fresh and aerated soybean oil and lard were fed to groups of W/Fu rats.

The weight of the rats and their life span were influenced by the kind of fat fed, but they were not influenced by the feeding of aerated fats. The hearts of

6.1 TRACE METAL CONTENTS OF FISH MEAL AND OF THE LIPID PHASE EXTRACTED FROM FISH MEAL

Lunde, Gulbrand (Central Institute for Industrial Research, Forskningsveien 1, Blindern, Oslo 3, Norway)
Journal of the Science of Food and Agriculture 24, No. 4, 413-419 (Apr. 1973)

Samples of industrially produced fish meal made from herring, mackerel, Norway pout, and capelin were collected. The samples were taken from different factories in various localities in Norway; and the meals were made from fish caught at various times in the year. Meals from the same species of fish were made in the laboratory also. The meal samples were ashed before analysis. Samples of meals to be analyzed for trace elements in lipids were extracted in a chloroform-methanol mixture.

The following trace elements were found in the fish meal: selenium, cadmium, zinc, lead, copper, iron, and cobalt. In the lipid phase extracted from the meal, selenium, arsenic, bromine, zinc, iron, and copper were found. This information and source of the meal are tabulated. Relatively large amounts of phosphorus were also found in the lipid phase. The levels of zinc, lead, and iron were higher in industrially produced meals than in laboratory produced meals. The natural zinc to cadmium ratio in sea water was assumed to be 100:1; the results of the analysis indicated that zinc seemed to be enriched relative to cadmium in the fish meal. The

6.130 THE DEVELOPMENT OF A FISH MEAL PLANT

Howell, H. D.
Commercial Fish and Fur Branch, Division of Fish and Wildlife, Ministry of Natural Resources, Ontario, Canada (1972), 15 pp.

This pamphlet briefly describes the development of a fishmeal plant designed to process the fish waste from plants processing Lake Erie fish. The fish waste from the processing operations in the area amounted to about 10 million pounds per year. Disposal of the waste was a problem, and development of a fishmeal plant was considered as a method for economic utilization of the waste raw material. Preliminary tests showed that fish meal prepared from the processing waste of Lake Erie fish produced fish meal of high enough quality to be competitive with fish meal from other sources. It contained slightly over 60% protein and performed satisfactorily when used in the regular poultry diet.

The original equipment for the plant cost about $71,079 (the period of construction and implementation of the project was 1967 through 1969). This total cost included: press, $5,330; decanter (horizontal centrifuge), $5,015; drier, $21,138; hammer mill, $2,042; fish oil tank, $1,514; and building (including labor), $25,998.

The cost of producing a ton of meal (based on 1969 production figures) ran $76.91. This total included: labor (2 foremen, 2 helpers), $21.77; utilities--gas for drier, $6.00, steam for cooker, $8.00, and power, $3.20; maintenance supplies, $16.63; maintenance labor, $4.55; overhead (estimated), $3.45; capital cost--equipment, $11.37; and building, $1.97.

6.199 FLAVOUR STUDIES WITH FISH MEALS AND WITH FISH OIL FRACTIONS IN BROILER DIETS

Wessels, Jacobus P. H., Alison Atkinson, Roelof P. van der Merwe, and Johannes H. de Jongh (Fishing Industry Research Institute, Muldersvlei, Cape Province, Republic of South Africa)
Journal of the Science of Food and Agriculture 24, No. 4, 451-461 (Apr. 1973)

Earlier reports indicated that chicken diets containing fish meal stabilized with an antioxidant imparted a "tainted" flavor to the carcass compared to cured fish meals in the diet. Tests were performed to determine the effects of diet additives, such as certain amines, on the flavor of the chicken carcass. In addition, the effects on carcass flavor were determined for such compounds as triglyceride and phospholipid fractions of fish oil in fish meal.

At 20% levels in the diet, fish meals extracted with ethanol, benzene, or warm or acidified water were fed to broiler-type chickens. The diets were given to the broilers from their fifth week until they were slaughtered at 8½ weeks of age. The carcasses were subjected to organoleptic evaluation; and the fatty acid constituents of the fat in the carcasses and of the oils in the fish meals were determined by gas chromatography.

The results indicated that carcasses of chickens fed diets containing fish meals that were extracted with fat solvents had a full chicken flavor. Diets that contained fish meal extracted with warm water or a warm, weak acid solution produced carcasses with a neutral flavor. Unextracted fish meal at a 20% level in the diet or the triglyceride fraction of fish oil at a 2.0% level in the diet produced carcasses with a "fishy" flavor. The phospholipid fraction of fish oil in

6.130

The composition, on the average, of the fish meal produced from fresh-water fish waste was: protein, 66.9%; moisture, 4.4%; fat, 9.5%; calcium, 6.9%; and phosphorus, 3.6%. The amino-acid composition was (expressed as percent of the protein): arginine, 5.8%; cystine, 0.5%; histidine, 2.0%; isoleucine, 4.0%; leucine, 6.8%; lysine, 7.0%; methionine, 2.9%; phenylalanine, 3.7%; threonine, 3.6%; tryptophan, 0.8%; tyrosine, 3.2%; and valine, 4.9%.

The processing plant was established on the basis of the availability of at least 10 million pounds of fish waste annually. At a cost of producing the fish meal of about $77 per ton, about $2.75 per protein unit [One percent protein in the meal is equivalent to one protein unit.] for the meal and $0.07 per pound for the oil would have to be realized if a price of $0.01 per pound was to be paid for the raw material.
[1 figure, 5 illustrations, 5 tables] FTP

6.139 (6.14) EFFECT OF CURING TREATMENT AND STORAGE ON THE PROTEIN QUALITY OF FISH MEAL

Wessels, J. P. H. (Fac. Agric., Univ. Natal, Pietermaritzburg, South Africa)
Chemical Abstracts 78, No. 7, 41823b (Feb. 19, 1973)

4.9 (0.4)

many of the rats showed unspecific focal myocarditis and focal fibrosis. The incidence of severe focal fibrosis was greatest for those rats fed corn oil, followed by those fed cottonseed oil, soybean oil, olive oil, beef fat, saturated medium chain triglycerides, butter, chicken fat, and lard. When aerated fat was fed the rats, six of the eight fats promoted increased incidence of focal fibrosis. The W/Fu rats showed lower incidence of focal fibrosis; but those rats fed soybean oil had more than those fed lard, and aeration of the fats led to higher incidence. Many of the livers of the rats showed lesions of the bile ducts; the groups fed cottonseed, soybean, olive, and corn oils had the highest incidences of severe lesions, and use of oxidized oils led to a still higher incidence. The long-term degenerative nutritional effects do not appear to be associated with the fatty acid composition of the fats; perhaps the effects may be due to minor constituents in the individual fats.
[1 figure, 5 tables, 18 references] FTP

4.82 ANIMAL AND VEGETABLE FATS IN MILK REPLACERS FOR VEAL CALVES. 5. FATTY ACID PATTERNS IN VARIOUS ADIPOSE TISSUES

Veen, W. A. G. (Stichting C.I.O.-Inst. Veevoeding "De Schothorst," Hoogland, Netherlands)
Chemical Abstracts 77, No. 25, 163371a (Dec. 18, 1972)

6.1

zinc, iron, and cobalt present in the lipid phase of the meal were probably complexed and bound by the phospholipids. The selenium found in the lipid phase (0.3 to 3 p.p.m.) indicated that lipid-soluble selenium compounds do not decompose during the production of fish meal.
[2 tables, 12 references] SW

6.14 CHANGES IN THE DEGREE OF RANCIDITY OF FATS IN FISH MEAL UNDER INDUSTRIAL CONDITIONS BY THE EFFECT OF ANTIOXIDANTS

Witas, Tadeusz (Szczecin, Poland)
Chemical Abstracts 78, No. 9, 56705m (Mar. 5, 1973)

6.199

the diet had no effect on carcass flavor. Adding amines such as trimethylamine, ethanolamine, and choline, to the diet aggravated the effects of the fishy flavor. A previous report of a high correlation between acceptable flavor and the levels of certain highly unsaturated fatty acid in the chicken carcass was confirmed in the tests. [3 tables, 15 references] SW

6.197 RESPONSE OF EARLY WEANED PIGS TO DIFFERENT LEVELS OF PHOSPHORUS, SUPPLIED BY ASHED FISH MEAL

Blanco, Virgilio Sergio (Univ. Maryland, College Park, Md.)
Chemical Abstracts 78, No. 7, 41911b (Feb. 19, 1973)

6.81 HISTOLOGY OF THE MANTLE AND PEARL SAC OF THE PEARL OYSTER PINCTADA MAXIMA (LAMELLIBRANCHIA)

Dix, Trevor G. (James Cook University of North Queensland, Townsville, Queensland, Australia)
Journal of the Malacological Society of Australia 2, No. 4, 365-375 (Mar. 31, 1973)
Address: Journal Treasurer, Malacological Society of Australia, c/o Dr. B. J. Smith, National Museum of Victoria, Russell St., Melbourne, Victoria, 3000, Australia.

The mantle of the pearl oyster is important in pearl culture since a required small mantle transplant together with a spherical pearl nucleus (or seed) are inserted into the visceral tissue of the host pearl oyster in the seeding procedure. The preferred response of the oyster is the proliferation of the transplanted mantle tissue to form a pearl sac which secretes concentric layers of nacre around the pearl nucleus to produce a gem quality pearl. In many cases, gem quality pearls are not formed. Other hazards of the industry are the death of the host pearl oyster shortly after the transplant operation and formation of irregular shaped pearls. In some pearl oysters, only an organic layer, or other low-value shaped specimens may be formed. In view of the mishaps that can adversely affect the pearl oyster, studies were undertaken to elucidate the normal mantle processes and the response of the pearl oyster to transplanted mantle, to wounds, and to changes occurring in transplanted mantle tissue.

The findings of the investigation suggest that most of the structural differentiation of the mantle may be related to function; that is, the functions of

8.42 (9.19) MERCURY IN SEALS FROM EASTERN CANADA

Sergeant, D. E. (Fisheries Research Board of Canada, Arctic Biological Station, Ste. Anne de Bellevue, Quebec, Canada), and F. A. J. Armstrong (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 6, 843-846 (June 1973)

This article reports on the mercury content of the tissues of four species of seals (having different migratory patterns and feeding ecology) from individual localities in Eastern Canada. Some of the data were summarized or extracted and placed in the table that follows. The livers had the highest levels of mercury (usually 1-100 p.p.m., but up to 387 p.p.m.) and the blubber had the lowest. The mercury content of the tissues of the seals increased with the age of the animal and appeared to vary with the position in the marine food web of the organisms that they eat. The harp seals (which feed on small pelagic fish and crustaceans) showed one order of magnitude less mercury content in the tissues than did the gray and harbor seals (which feed on large pelagic and benthic fish and cephalopods). However, other factors may enter in such as the mercury levels of the waters in which the seals reside.

7.0 HANDBOOK OF CHROMATOGRAPHY

Zweig, Gunter, and Joseph Sherma (editors)
CRC Press, Cleveland, Ohio (1972), Vol. I, 784 pp., $35.00; Vol. II, 343 pp., $19.95
Thomas Wolf and John H. Callahan (Colgate-Palmolive Co., 909 River Road, Piscataway, NJ 08854) (reviewers)
Journal of the American Oil Chemists' Society 50, No. 6, 233A (June 1973)

The handbook contains information from the four branches of chromatography. Volume I contains an index of over 12,000 compounds and 546 tables of retention data obtained by gas (GC), liquid (LC), paper (PC), and thin layer (TLC) chromatographies. The tables on GC and LC compare separations on different packings and give column dimensions, temperatures, flow rates, and detectors used for each. Also, for PC and TLC, type of paper or adsorbent, solvent system, and visualization techniques are listed.

Volume II contains a working description of the four chromatographic methods and a discussion of sample isolation and derivative formation under 24 class headings. In addition, it contains a directory of books on chromatography. The reviewers believe that both volumes are worthwhile as sources of reference to the subject. FTP

8.42 (0.35)(9.13) CADMIUM UPTAKE BY FIDDLER CRABS EXPOSED TO TEMPERATURE AND SALINITY STRESS

O'Hara, James (Belle W. Baruch Coastal Research Institute, University of South Carolina, Columbia, SC 29208)
Journal of the Fisheries Research Board of Canada 30, No. 6, 846-848 (June 1973)

Adult fiddler crabs, Uca pugilator, were exposed to various temperature and salinity regimes and 10 p.p.m. of Cd^{++} in order to determine the influence of temperature-salinity interaction on rate of uptake and translocation of cadmium within the tissues. The temperature-salinity regimes included 10° C. and 10 ‰ salinity; 10° C. and 30 ‰ salinity; 25° C. and 10 ‰ salinity; 25° C. and 30 ‰ salinity; 33° C. and 10 ‰ salinity; and 33° C. and 30 ‰ salinity. The crabs were exposed to the Cd^{++} (as $CdCl_2$) for 72 hr. At the end of 24, 48, and 72 hr. exposure periods, the animals were sacrificed, and their gills and hepatopancreas were removed and analyzed for cadmium content.

At each temperature (10°, 25°, and 33° C.), crabs in low salinity water accumulated higher levels of cadmium than did those exposed to high salinity water. This effect was probably due to the osmotic stress associated with the different salinity levels of the environment. Temperature of the environment had relatively slight effect on the accumulation of cadmium in the gills at high salinity, but it did have a strong effect at low salinity. Probably the greater metabolic activity at higher temperatures increases the rate of active uptake of salts by the fiddler crabs. Some of the data on the cadmium content of the gill and hepatopancreas from the fiddler crabs exposed to 10 p.p.m. cadmium over a 72-hr. period under different temperature-salinity regimes are shown in the table that follows.

7.461 RAPID METHOD FOR THE ROUTINE DETERMINATION OF SODIUM CHLORIDE IN FOODS IN GENERAL AND FISH PRODUCTS IN PARTICULAR

Monselise, J. J. (Lab. Assis Ltd., Ramat Gan, Israel)
Chemical Abstracts 78, No. 7, 41674b (Feb. 19, 1973)

7.463 APPLICATION OF THE FLUORIDE ELECTRODE METHOD ANALYSIS OF ENVIRONMENTAL AND BIOLOGICAL SAMPLES. 2. ANALYSIS OF BIOLOGICAL SPECIMENS AND SOIL

Kondo, Takeshi (Dep. Hyg., Tokyo Dent. Coll., Tokyo, Japan)
Chemical Abstracts 78, No. 9, 54983b (Mar. 5, 1973)

6.81

the inner, middle, and shell folds of the mantle primarily are muscular, sensory, and secretory, respectively. The tall, stratified, columnar nonciliated, nonpigmented epithelium on the shell (or outer) fold secretes part of the periostracum (or lining) of the pearl sac and the inner, calcarious layer of the shell. A single layer of ciliated, columnar epithelium, with pigmented cells, covered the largest fold of the inner mantle. Cells of the middle mantle epithelium near the fold of the inner mantle were similar, but the remainder were nonpigmented with lightly basophilic cytoplasm. The author suggests that under abnormal conditions cells in the mantle folds may secrete periostracum rather than nacre; the result is the production of nongem quality pearls or other growths.
[17 figures, 19 references]

SW

8.42 (0.35)9.13)

Environmental regime of the fiddler crabs		Cadmium (Cd^{++}) content of the tissues of the fiddler crabs exposed to 10 p.p.m. cadmium over a 72-hr. period				
Temperature	Salinity	Total amount in the gill and hepatopancreas	Relative amount		Concentration	
			In the gill	In the hepatopancreas	In the gill	In the hepatopancreas
°C.	‰	µg.	%	%	p.p.m.	p.p.m.
10	10	1.86	29.9	70.1	25.1±3.7	30.1±2.2
10	30	0.75	38.6	61.4	10.2±0.8	6.5±2.9
25	10	8.65	19.9	80.1	70.8±8.8	133.8±30.2
25	30	1.85	20.2	79.8	15.5±1.1	33.7±6.3
33	10	17.44	16.2	83.8	92.0±15.1	200.2±22.1
33	30	4.9	11.3	88.7	24.1±3.5	77.5±13.1

Note: The author's table also included pertinent data at periods of 24 and 48 hr.

[1 table, 11 references]

FTP

8.42 (9.19)

Species of seal Locality Age range Number of samples	Mercury concentration in the tissues							
	Blubber		Muscle		Liver		Hair	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.	p.p.m.
Gray seal Sable Island Pup to 25 years 11 seals	0.02-0.16	0.08	0.17-2.35	1.13	0.46-387.0	88.2	--	--
Harbor seal Sable Island 1 to 8 years 8 seals	0.02-0.09	0.04	0.31-0.75	0.71	2.14-21.7	8.86	0.75-3.80	1.56
Hood seal Magdalen Island, Quebec 8 to 13 years 3 seals	0.08[1]	(0.08)[1]	0.62-1.93	1.21	27.2-45.2	37.2	2.64-7.63	5.06
Harp seal Escoumins, Quebec 1 to 18 years 20 seals	0.02-0.05	0.03	0.16-0.50	0.38	0.84-10.00	3.63	--	--

[1] One sample of blubber reported; therefore, one value.

[2 tables, 8 references]

FTP

8.42 MOLYBDENUM CONCENTRATIONS IN TISSUES OF RAINBOW TROUT (SALMO GAIRDNERI) AND KOKANEE SALMON (ONCORHYNCHUS NERKA) FROM WATERS DIFFERING WIDELY IN MOLYBDENUM CONTENT

Ward, James V. (Dept. of Environmental, Population, and Organismic Biology, University of Colorado, Boulder, CO 80302)
Journal of the Fisheries Research Board of Canada 30, No. 6, 841-842 (June 1973)

The molybdenum content of rainbow trout and kokanee salmon is shown in the table that follows. The molybdenum levels in these fish are far less than those found by other workers in mammals. This difference may be due to the well-developed osmoregulatory system of the fishes.

9.0 (1.88) EXPOSE SYNOPTIQUE DES DONNÈES BIOLOGIQUES SUR LA MOULE MYTILUS GALLOPROVINCIALIS (LAMARCK 1819) (ATLANTIQUE ET MÉDITERRANÉE)
[SYNPOSIS OF BIOLOGICAL DATA ON THE MUSSEL MYTILUS GALLOPROVINCIALIS (LAMARCK 1819) (ATLANTIC AND MEDITERRANEAN)]

Lubet, Pierre (Université de Caen, Caen, France)
FAO Fisheries FIR/S No. 88, Food and Agriculture Organization of the United Nations, Rome, Italy (Jan. 1973), iv + 38 pp. [Distribution restricted]

This synopsis gives information on the identity, distribution, biology, population, exploitations, and management of the mussel M. galloprovincialis.
[87 references] FTP

9.1 MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. ANNELIDA: OLIGOCHAETA

Cook, David G. (National Museum of Natural Science, Ottawa, Canada), and Ralph O. Brinkhurst (Dept. of Zoology, University of Toronoto, Toronto 5, Ontario, Canada)
NOAA TR NMFS CIRC-374, National Marine Fisheries Services, U.S. Dept. of Commerce, Seattle, Wash. (May 1973), 23 pp. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $0.35.

The manual includes an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the marine Oligochaeta of the East Coast of North America. The Families Naididae, Tubificidae, Enchytraeidae, and Megascolecidae are treated.

Publication of this circular is most timely in view of the growing universal emphasis on environmental work and the urgent need for more precise and complete identification of coastal organisms than has been available. It is mandatory, wherever possible, that organisms be identified accurately to species. Accurate, scientific names unlock the great quantities of biological information stored in libraries, obviate duplication of research already done, and make possible prediction of attributes of organisms that have been inadequately studied.

Extracted

9.10 A GUIDE TO THE MEASUREMENT OF MARINE PRIMARY PRODUCTION UNDER SOME SPECIAL CONDITIONS

Prepared by the Special Committee on Oceanographic Research Working Group No. 24, UNESCO, Paris, France (1973), 73 pp. Price $3.00, £1, fr12. Available from UNESCO sales agents.

This monograph deals with the most practical methods for estimating primary production under special conditions (such as those beneath polar ice and the turbid conditions in estuaries, polluted waters, and exceptionally eutrophic and oligotrophic waters). Suggestions are made as to ways in which the original carbon-14 technique can be modified to meet the special conditions existing in some marine environments. The manual stresses the practical methods rather than the theoretical aspects. FTP

9.0 (9.7) MANUAL OF FISHERIES SCIENCE. PART 1. AN INTRODUCTION TO FISHERIES SCIENCE

Kesteven, G. L. (Fishery Research and Development Project, Apartado Postal M-10778, Mexico)
FAO Fisheries Technical Paper No. 118, Food and Agriculture Organization of the United Nations, Rome, Italy (Feb. 1973), 43 pp. (Distribution restricted)

This technical paper is one in the series of FAO Manuals in Fisheries Science. It is based on the lectures given by the author mostly at the FAO/DANIDA Training Center in the Methodology of Fishery Science (Biology) in Frederikshavn, Denmark. This article is a draft version and is intended for use at FAO training centers and in FAO field projects. Eventually it will be revised and published in the official languages of FAO. The subject matter covered in the paper is:

"Fisheries Science as Part of Science," "The Systems Studied by Fisheries Scientists," "Strategies and Programmes of Research in Fisheries Science," and "Applications of the Results of Fisheries Science."

[9 figures, 5 tables, 8 references] FTP

8.42

Sample	Molybdenum (Mo) content of sample on wet basis			
	Rainbow trout (S. gairdneri)			Kokanee salmon (O. nerka)
	From water with trace Mo content	From water with 6 ppb Mo content	From water with 300 ppb Mo content [1]	From water with 300 ppb Mo content [2]
	ppb [3]	ppb	ppb	ppb
Whole fish	43	--	85	--
Liver	110	41	223	100
Spleen	48	92	208	85
Kidney	108	113	147	124
Skin	71	70	99	43
Bone	118	146	224	339
Muscle	10	10	13	14
Intestine	67	61	134	49
Stomach	47	35	332	228
Brain	21	17	92	34

[1] Four fish in sample.
[2] Twelve fish in sample.
[3] ppb = parts per billion.

[1 table, 2 references] FTP

9.11 SALTS IN THE SEA

Degens, Egon T. (Dept. of Chemistry, Woods Hole Oceanographic Institution, Woods Hole, Mass.)
Nature 243, No. 5409, 504-507 (June 29, 1973)

Using data on chemical analyses of hydrothermal fluids from the East African region (primarily Lake Kivu), the author speculates on the kind and quantity of salts that have been discharged from the oceanic lithosphere to the sea during geologic times. The author believes that the waters of the East African rift have received their salts under geological conditions similar to those that exist when waters are released to the sea along oceanic rifts and that this process was the same during early stages in the development of the Earth's crust.

Sea water started out as a carbonate solution rich in magnesium; by a series of mineral equilibria, it gradually developed to a sodium chloride dominance. The excess in CO_2 was removed by the deposition of carbonate and by inorganic and biological reduction of CO_2. The steady state conditions were probably established at the end of the Precambrian era, at which time organisms began to develop a carbonate shell.

[1 figure, 3 tables, 25 references] FTP

9.1 (1.89) ACANTHASTER AGGREGATIONS: INTERPRETED AS PRIMARILY RESPONSES TO NATURAL PHENOMENA

Dana, T. F., W. A. Newman, and E. W. Fager (Scripps Inst. Oceanogr., La Jolla, CA 92037)
Pac. Sci., 26, No. 4, 355-372 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 3, Abstract No. 3Q2587M, 122 (Mar. 1973)

The 1969 Westinghouse Acanthaster survey provided a basis for studying large groups of A. planci on coral reefs in the Pacific Ocean. Although abundance was variable, large numbers of the starfish were most frequently found on leaward seaward reefs, on areas of moderate to luxuriant coral growth, and in waters less than 18.3 m. deep. The most significant environmental factor is that the position of the starfish on the reefs is related to trade-wind direction. Population studies indicate that large aggregations of the starfish have grown in a normal manner, and few of the reported infestations meet the published criteria defining an infestation. The authors theorize that large aggregations are redistributions of existing populations due to food limitations. They further believe that typhoons are the principle causative agents of the food limitations, and they present the A. planci density estimates in relation to typhoon frequencies to support their view. SW

9.12 CORRELATIONS BETWEEN SEASONAL RIVER DISCHARGE AND LOCAL LANDINGS OF AMERICAN LOBSTER (HOMARUS AMERICANUS) AND ATLANTIC HALIBUT (HIPPOGLOSSUS HIPPOGLOSSUS) IN THE GULF OF ST. LAWRENCE

Sutcliffe, W. H., Jr. (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 6, 856-859 (June 1973)

The author found positive correlations between the monthly discharge of water of the St. Lawrence River and the annual regional catch of the American lobster and the Atlantic halibut. The lag period for lobster was 9 years and that for halibut was 10 years. These lag periods (to account for age at maturity or commercial size) permitted the author to make predictions on the supply of these species in the region involved.
[4 figures, 6 references] FTP

9.12 (1.89) CROWN-OF-THORNS IN THE RED SEA

Nisbett, Alec
New Scientist 58, No. 841, 74-76, 78 (Apr. 12, 1973)

Predations of coral reefs by large numbers of crown-of-thorns starfish have caused concern throughout the world. The questions that were raised are: What causes plagues of the starfish like those in the Pacific Ocean? and What stops them? A British study unit, the Cambridge Coral Starfish Research Group, working in the Red Sea has discovered the factors that hold the starfish population in balance. The Group's first lines of inquiry into the triton shellfish and the painted shrimp as predators proved that neither of these could control the population of the starfish. In addition, the influence of pollution had no effect on population buildup.

The researchers discovered that a substance given off by a feeding starfish attracts other starfish; they tend to move toward feeding starfish rather than unpredated coral. This information explains how groups of starfish form naturally. Such an aggregation can become very large because of the increased reproductive efficiency of a group. The females release large numbers of eggs which float among the plankton present until they are fertilized. The floating larvae feed on the plankton until they settle. If they settle on live coral they will be consumed by the polyps; the author suggests that more starfish are eaten by corals than corals eaten by starfish. Starfish larvae that survive enter the holes of dead corals where they metamorphose to the adult stage.

9.12 WOOD-BORING BIVALVES, OPPORTUNISTIC SPECIES IN THE DEEP SEA

Turner, Ruth D. (Museum of Comparative Zoology, Harvard University, Cambridge, MA 02138)
Science 180, No. 4093, 1377-1379 (June 29, 1973)

During a dive of the D.S.R.V. Alvin (a small deep-sea submersible operated by the Woods Hole Oceanographic Institution) on June 14, 1972, small panels of wood were pushed into the bottom sediment at a depth of 1,830 m., about 180 km. south of Woods Hole, Mass. One hundred and four days later, two panels were removed by use of the mechanical arm of the submersible. The wood was so weakened by two species of bivalve wood borers (subfamily Xylophagainae, family Pholadidae) that it began to fall apart when being picked up by the arm of the Alvin. The two species of wood borers present were Xylophaga n.sp. and Xyloredo ingolfia. The author states that the high reproductive rate, high population density, rapid growth, early maturity, and utilization of a transient habitat of these wood borers classify them as opportunistic species, the first recorded from the deep sea.

The Xylophagainae use wood as a substrate and for food (as host organisms for symbiotic bacteria in the gut or by means of endogenous cellulase). The author believes that they are apparently the most important deep-sea organisms involved in decomposing woody plant material in the deep sea to available food sources as (1) fecal pellets for detritus feeders, (2) as larvae or adults for predators, and (3) as dead remains for scavengers.
[3 figures, 1 table, 27 references] FTP

9.12 MENHADEN TAGGING AND RECOVERY: PART I--FIELD METHODS FOR TAGGING MENHADEN, GENUS BREVOORTIA

Pristas, Paul J. (National Marine Fisheries Service, NOAA, Gulf Coastal Fisheries Center, Panama City Laboratory, Panama City, FL 32401), and Thurman D. Willis
Marine Fisheries Review 35, Nos. 5-6, 31-35 (May-June 1973)

This paper describes the methods and equipment used to mark over 1 million menhaden, Brevoortia tyrannus and B. patronus, along the Atlantic and Gulf coasts of the United States from 1966-1971.
[12 figures, 7 references] Authors' abstract

9.12 (1.92) COMPARATIVE STUDIES ON THE SWIMMING BEHAVIOUR OF THE BLIND CAVE FISH AND THE GOLDFISH

Yasuda, Kunio (Kyoto University, Kyoto, Japan)
Comparative Biochemistry and Physiology 45, No. 2A, 515-527 (June 1, 1973)

The swimming speed and patterns of swimming tracks of blind cave fish (Amblyopsis speloes) and artificially blind goldfish (Carassius auratus) were studied at various temperatures in still water. In order to exclude some environmental factors affecting fish behavior, blind fish were used.

Observations were reported on the behavior of the blind cave fish as follows. This fish is tropical, and normally is kept at the temperature range of 26°-30° C. Below 10° C., they did not move; they began to swim at about 13° C. At 15° C., most of the fish swam at a speed of 100 cm. per 15 sec.; at 30° C., most of them swam at a speed of 170 cm. per sec. There were two groups of fish with different behavior patterns. Fishes in the first group swam along the side walls of the aquarium and rarely near the center. Fishes in the second group swam throughout the aquarium and never along the side walls. This group had irregular ability to find food and grew slowly. Fish in the first group found food more quickly and grew faster.

The normal goldfish swam actively at 25° C. and became inactive below 20° C. The artificially blinded goldfish swam at higher speeds than the sighted goldfish. The behavior pattern of the blind goldfish became similar to that of the blind cave fish. [15 figures, 19 references] SW

9.12 DISTRIBUTION AND DIRECTION OF MOVEMENT OF COHO SALMON (1.33) AT EARLY STAGE OF SPAWNING MIGRATION IN THE NORTHWESTERN NORTH PACIFIC OCEAN

Machidori, Seiji
Bulletin Far East Fisheries Research Laboratory No. 6, 95-100 (July 1972) (Shimizu 424, Japan)

The season of the Japanese high seas salmon fisheries begins in May and ends in July or August. In May and June there are a few coho salmon taken. The author suggests that the small coho catch at this time indicates that the species is present but is outside the commercial fishing area. In July and August the coho salmon becomes the major species caught. Using information gained from longline fishing and surface gill-netting operations in waters south of the commercial fishing area from off the coast of Hokkaido to 175° W., the author made a survey of coho distribution in June and early July. He found a wide distribution of coho salmon from west to east in the area bounded by 41° N. to 47° N. and 163° E. to 175° W. (This area begins about 5° S. of the Aleutian Islands and the tip of the Kamchatka Peninsula which are located at about 50° N.). Coho salmon were found in waters of surface temperatures ranging between 6° to 11° C., but there were more fish caught in waters at 8° to 10° C. The author suggested that the coho salmon were restricted by the temperature to warmer southern waters at the time--June and early July. In mid-July, 168 coho salmon were taken and tagged between 42° N. and 46° N. and between 170° E. and 175° W. Of these tagged individuals, 13 were recovered by Japanese fishermen in the area between 45° N. and 49° N. and between 165° E. and 174° E. The coho salmon were calculated to be moving northwestward at an average rate of travel of 13.2 miles per day.
[3 figures, 1 table, 8 references] SW

9.12 MENHADEN TAGGING AND RECOVERY: PART II--RECOVERY OF INTERNAL FERROMAGNETIC TAGS USED TO MARK MENHADEN, GENUS BREVOORTIA

Parker, R. O., Jr. (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516)
Marine Fisheries Review 35, Nos. 5-6, 36-39 (May-June 1973)

Plate and rotating grate magnets installed in various locations in reduction plants effectively recover internal ferromagnetic tags used to mark menhaden. Tag recovery efficiency rates for large (adult) tags range from 14 to 97 percent with a mean of 64 percent and for small (juvenile) tags range from 5 to 86 percent with a mean of 39 percent. Magnet installations do not interfere with the reduction operation, but facilitate it by removing scrap metal.
[7 figures, 10 references] Author's abstract

9.12 (1.89)

Further studies of the group showed that the starfish population is held in check by two predators: the trigger fish and the puffer fish. The author concluded that complete eradication of starfish aggregations is not necessary because the population will be reduced naturally by the predators; he also cautions that the predators of the starfish should be protected by conservation methods.
[3 illustrations] SW

9.14 FOOD COMPOSITION FOR SHRIMP (1.85)

Shigeno, Kunihiko, Kazumi Kumada, Osamu Deshimaru, Takayuki Aramaki, Katsunobu Kuroki, and Kazua Kitaue (Prefecture Locale Autonome de Kagoshima-Ken) (pat.)
French Demande 2,121,733 (Sept. 29, 1972)
Chemical Abstracts 78, No. 23, 146519h (June 11, 1973)

9.15 BRANCHIOMYCOSIS: A NEW FUNGAL DISEASE OF NORTH AMERICAN FISHES

Meyer, Fred P. (Bureau of Sport Fisheries and Wildlife, Fish Farming Experimental Station, Stuttgart, AR 72160), and Jordan A. Robinson (McGehee, AR 71654)
Progressive Fish-Culturist 35, No. 2, 74-77 (Apr. 1973)

Branchiomycosis, a gill disease caused by fungi of the genus Branchiomyces, is considered a major problem in European commercial fish production. Epizootics develop rapidly and mortality rates are high. The loss of 50 percent of an infected population of Siluris glanis in 4 to 8 days was reported. A 100 percent loss of Coregonus albula when they were stocked in rearing ponds with infected carp was also reported. In Italy, 20 to 50 tons of Alburnus alborella were reported killed by Branchiomyces in Lake Lugano during 1970. Branchiomyces has been reported only from the European countries of Germany, Poland, Czechoslovakia, U.S.S.R., Italy, and Hungary. Prior to this report, it has not been described from fish in North America.

Branchiomyces produces the external signs of disease generally identified as "gill rot." Affected tissues lose their bright red color due to impaired circulation. As the infection spreads, diseased gill tissue becomes necrotic and assumes a white or brownish color. Necrotic tissue sloughs away, often leaving gill arches with sizable denuded areas. Infected fish usually are listless, exhibit signs of anoxia, lose their equilibrium, and die.

This paper reports the outbreaks of branchiomycosis in Arkansas that occurred only during hot weather. The affected pond had a long history of use for fish culture and contained heavy deposits of organic matter. Water temperatures at the

9.16 (0.5) EXPERIMENTAL OYSTER TRANSPLANTING IN LOUISIANA

Tarver, Johnnie W., and Ronald J. Dugas
Technical Bulletin No. 7, Louisiana Wild Life and Fisheries Commission, Oyster, Water Bottoms and Seafoods Division, New Orleans, La. (Mar. 1973), 10 pp. Price not given.

This report is an account of the experimental transfer of oysters from the eastern portion of Lake Pontchartrain and in Lake St. Catherine (polluted areas) to oyster lease areas where the oysters were allowed to depurate for a period of time until they were safe for human consumption. Information is given on the methods and procedures, including costs and accounts, of the successful operation. This report was issued to help other public service decision makers who may be faced with a similar situation.
[3 figures, 5 references] FTP

9.15 MICROBIAL DEGRADATION OF THE LAMPREY LARVICIDE 3-TRIFLUOROMETHYL-4-NITROPHENOL IN SEDIMENT-WATER SYSTEMS

Kempe, Lloyd L. (Fish and Wildlife Service, U.S. Dept. of the Interior, Ann Arbor, MI 48104)
Technical Report No. 18 (Jan. 1973), 16 pp. Obtainable from Great Lakes Fishery Commission, 1451 Green Road, P.O. Box 640, Ann Arbor, Mich. Price not given.

The sea lamprey is controlled in the Great Lakes by the application of the sodium salt of 3-trifluoromethyl-4-nitrophenol (TFM), a selective larvicide, in tributary streams at a concentration of 1 to 6 µg. per milliliter. Most of the TFM leaves the streams within a few days. An investigation to determine the ultimate disposition of the larvicide was performed.

Mixtures of TFM, water, and sediment were incubated at 22° C. The TFM decreased progressively in the mixture and disappeared in 1 to 4 weeks; in addition, the concentrations of the fluoride ion increased and the mixture became nontoxic for sea lamprey larvae and goldfish. If the TFM degradation process stopped, the process resumed upon the addition of nutrient broth to the mixture. Loss of TFM could be prevented by the addition of an antiseptic, such as phenol, or by heat sterilization. Microorganisms isolated from streams and sediments degraded TFM added to nutrient broth. The author concluded that the larvicide is degraded by the microflora inhabiting the sediment water systems.
[7 figures, 8 references] SW

9.16 (9.6) AQUACULTURE: THE FARMING AND HUSBANDRY OF FRESHWATER AND MARINE ORGANISMS

Bardach, John E., John H. Ryder, and William O. McLarney
John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10016 (1972), 868 pp. Price $37.50.
Environmental Science & Technology 7, No. 5, 465 (May 1973)

This book describes, species by species, all the aquatic plants and animals that are cultivated for food in every part of the world. The methods of cultivation are also described together with the current and projected state of the art. The biology and ecology of the cultivated organisms are included. Yields and problems of aquaculture are discussed. SW

9.15 (9.12)(1.69) PARASITES AS INDICATORS OF ENGLISH SOLE (PAROPHRYS VETULUS) NURSERY GROUNDS

Olson, Robert E., and Ivan Pratt (Marine Science Center, Oregon State University, Newport, OR 97365)
Transactions of the American Fisheries Society 102, No. 2, 405-411 (Apr. 1973)

The extent to which English sole utilizes offshore nursery grounds during the first year of life is not known. Other investigators have used the presence of parasites to provide data on migrations of fish hosts. The objective of this study was to find parasites of juveniles that have life cycles operating only in an estuary and to use these parasites as tags indicating that the host fish had resided in the estuary. The English sole uses Yaquina Bay, Oreg., during a portion of its first year. Young of the first year appear in the bay in February, remain abundant from April to September, and then migrate to offshore areas in October. Examination of the sole collected from the bay and from offshore areas showed certain parasites that were acquired only in the bay. The parasite was Echinorhynchus lageniformis which proved useful in determining that the juvenile sole spent some time in the bay. The incidence of infection with the parasite in bay fish before migration (29.9%) was similar to incidence of infection in sole collected offshore after migration (28.5%). This result suggests that the young sole migrated from the bay to offshore waters, and that Oregon estuaries are the exclusive nursery grounds for this species. Two other parasites were considered to be indicators of residence of young sole in the upper estuary. These were the nematode Philometra americana and a microsporidan species that was classified in the genus Glugea.
[2 figures, 5 tables, 15 references] SW

9.16 (1.85) ECONOMIC FEASIBILITY OF FRESH WATER PRAWN FARMING IN HAWAII

Shang, Yung Cheng (University of Hawaii, Honolulu, Hawaii)
Bulletin published by the Economic Research Center, University of Hawaii, Honolulu, Hawaii (June 1972), 49 pp.

One of the most successful investigations into the intensive cultivation of aquatic animals was accomplished by the Fish and Game Division of the State of Hawaii with Malaysian prawn culture. This state unit imported 36 giant freshwater prawns (Machrobrachium rosenbergii) from Malaysia in 1965. After studies and rearing trials, a mass rearing technique was developed. The eggs of the prawn can be hatched and the young can be reared through their entire life cycle. The advantages of this species over other prawns are as follows: it is adaptable to a wide range of salinity; it is amenable to culture techniques; it breeds throughout the year; a large female can produce 80,000 eggs; the female carries and cares for the eggs which results in high hatching; it has a short larval life; it is a fast growing omnivore; and frozen freshwater prawn tastes better than saltwater shrimp.

The economic feasibility of prawn production was investigated, and the results are presented in six sections. The sections cover the method of evaluating investment worth, estimating costs, and measuring the economic worth of prawn farming. Prawn farming would be profitable for a 50-150 acre farm with prawn prices, at the farm, of $1.60-$2.00 per pound. The prospects of the industry depend on the market demand for prawn. But the large market for prawn will not mitigate the necessity for bringing the production costs down. For a new venture embarking on commercial prawn farming, it is essential that the operation be suspervised by a person specifically trained in the culture of prawns.
[6 figures, 17 tables, 4 references] SW

9.15

time the disease appeared were in the range of 30° to 35° C. The addition of well water (18° C.) temporarily slowed the rate of losses, but did not affect ultimate survival.

The B. sanguinis readily infects several species of fish and it is likely to infect other native fishes. Spores apparently survived winter conditions in Arkansas in pond water or bottom mud. The failure of European workers to control branchiomycosis strongly indicates that every effort should be made to prevent the spread of this fungus in the United States. Infected fish should be destroyed and ponds sterilized before draining. While in this instance drying may have eliminated the fungus from the contaminated pond, we believe that the European practice of chemical sterilization would be more dependable.
[3 figures, 16 references] Extracted

9.15 (9.16) PREPARATION FOR PROPHYLAXIS AND MEDICAL TREATMENT OF EXTERNAL DISEASES OF FISH

Kol'gaev, A. M., and A. P. Ivanova (Pacific Ocean Scientific-Research Institute of Fishing and Oceanography) (pat.)
U.S.S.R. 364,322 (Dec. 28, 1972)
Chemical Abstracts 78, No. 26, 164092t (July 2, 1973)

9.16 (9.17) EXPERIMENTS TO RE-ESTABLISH HISTORICAL OYSTER SEED GROUNDS AND TO CONTROL THE SOUTHERN OYSTER DRILL

Pollard, J. F.
Technical Bulletin No. 6, Louisiana Wild Life and Fisheries Commission, Oyster, Water Bottoms and Seafoods Division, New Orleans, La. (Jan. 1973), 82 pp. Price not given.

The purpose of this study was to obtain information on cultch planting programs and fresh-water diversion activities that would assist in the preservation, enhancement, and management of the public oyster seed grounds east of the Mississippi River. To obtain this information, biological and hydrological samplings were made in the subdelta bays and marshes east of the Mississippi River below New Orleans, La.

In planning a cultch planting, three main considerations are involved: the location of the planting, the timing of the planting, and the type of cultch. This study revealed that most of the public areas available for planting were infested by the southern oyster drill. Comprehensive data were obtained on area salinity and water temperatures which, when compiled with information on oyster drill occurrence, provided valuable insight for site selection for cultch planting and for achieving a desirable salinity regime by manipulation of fresh-water diversions. The peak periods of oyster set were bimodally May-June and August. Clamshell (valves of the brackish-water clam) is the favored type of cultch. Base line data were collected for proposed fresh-water diversions from the Mississippi River to depress the salinity regime of the area to control the southern oyster drill (and for other purposes).
[33 references and an appendix with 8 tables and 29 figures] FTP

9.16 SOME CHARACTERISTICS OF THE PARENT-PROGENY RELATIONSHIP IN THE DON PIKE-PERCH [LUCIOPERCA LUCIOPERCA (L.)]

Savel'yeva, E. A., and T. F. Shuvatova (Azov Fisheries Research Institute (AzNIIRKh), Rostov-on-Don, U.S.S.R.)
Journal of Ichthyology 12, No. 2, 241-248 (1972)

Many reports are avaiable to show that, in the majority of food fishes, the major mortality occurs in the early stages of life--the eggs and larvae. In addition, many investigators believe that the condition of the spawners influences the quality of their progeny and, consequently, their ability to survive. Experiments were carried out with groups of three sizes of fish to further elucidate this relationship.

Female and male fish were injected with pike-perch pituitary gonadotropic hormone. After egg laying and fertilization had taken place, the spawners were analyzed for length, age, and weight; the females were analyzed for fat content in muscle, liver, and gonads. The characteristics of the eggs were studied by measuring and weighing the larvae and weighing the yolks separately. Protein content of the embryos and larvae were determined; respiration rate of the larvae were also determined.

The results indicate that the shortest maturation period following pituitary injection was found in females of the middle sized group (42-47 cm.). This group had the highest content of trophic substances; that is, fat in the muscle and protein in the liver. The eggs from this group were highest in yolk reserves and protein content. A correlation was found between the age of the female spawner and the

9.17 THE AQUATIC ENVIRONMENT, FISHES AND FISHERY ROSS LAKE AND THE CANADIAN SKAGIT RIVER INTERIM REPORT VOLUME 1

Anonymous
City of Seattle, Dept. of Lighting, International Skagit-Ross Fishery Committee (Nov. 1972), 289 pp.

This report contains the results of investigations carried out by the agencies represented on the International Skagit-Ross Fishery Committee through the period of the 1971 field season. The report begins with a history of the Ross Lake development program and its status. The report continues with a description of the state of the environment relative to Ross Lake and the Skagit River and their tributary streams. A large section is given to the present state of fishes and the fishery with projections for its future. Projections for different stages of construction of the dam and their effects on the environment are described.
[62 figures, 59 tables, 37 references] SW

9.17 (1.0118) LAKE ERIE'S FISH COMMUNITY: 150 YEARS OF CULTURAL STRESSES

Regier, H. A. (University of Toronto, Toronto 5, Ontario, Canada), and W. L. Hartman (Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Sandusky, OH 44870)
Science 180, No. 4092, 1248-1255 (June 22, 1973)

In this review, the quality of the water in primeval Lake Erie is compared with current conditions in the lake: the ecological and cultural stresses are identified, the effects of the fishery and the other stresses on the lake's resources are considered, and resource management problems are described.

Lake Erie was "discovered" by Louis Joliet in 1669. The land draining into it supported large stands of hardwood and hemlock timber. Between the forests lay vast grasslands. Large marshes bordered parts of the lake, with the Great Black Swamp at the southwest corner. Runoff waters entering the lake were clear, soft, and free of nutrients; most lake water was clear throughout the year without blooms of algae. With the advent of civilization, the destruction of the forests, the burning of the grassland, and drainage of the swamps turned the adjacent land areas into rich farmlands. These changes reduced the spawning grounds; thus, the great quantity and variety of fish that depended on the primitive conditions of the lake could not be maintained. The present fish community consists mainly of yellow perch, white bass, channel catfish, drum, carp, goldfish, and rainbow smelt.

The ecological stresses on the lake are cultural and natural. The cultural stresses are the commercial fishery, eutrophication, introduction of nonindigenous aquatic species, shoreline construction and drainage, and pollution. The severity

9.19 CONTROL OF MERCURY CONTAMINATION IN FRESHWATER SEDIMENTS

Feick, George, Edward E. Johanson, and Donald S. Yeaple
Environmental Protection Technology Series EPA-R2-72-077 (Oct. 1972), ix + 156 pp. Price $2.00. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Methods for controlling the release of mercury from sediments were investigated and developed. The study indicated that the behavior and mobility of mercury in natural water and soil are controlled by the strong binding of the mercury ion to sediments, suspended particles, and soils. The mercury-binding capacity of sediment increases with the increase of organic matter in it. Oxidation of sediment, as exposing dredge spoil to air, or the presence of salt decreases its mercury-binding capacity. Sediments are less binding to the methylmercuric ion than to the mercuric ion. Since most sediments contain the mercuric form, binding the inorganic mercury in a form that is resistant to methylation would decrease the mobility of the contaminant. This reaction can be accomplished by the addition of long-chain alkyl thiols to bottom sediments. These additions are nontoxic to fish and prevent uptake of mercury by the fish through immobilization of the mercury in the sediment. The thiols may impart an objectionable odor or taste to the water. Mechanical dredging of mercury contaminated sediments may increase the local concentrations of waterborne mercury from less than 1 part per billion to 0.1 to 1.0 p.p.m. Less than 1% of the increase is water-soluble mercury; the remaining 99% is bound to particulate matter which will settle. The settling particulate matter will be readily ingested by bottom-feeding fish. Mercury contaminated dredge spoil in

9.17 (1.0118)

of the natural stresses may be compounded by the presence of the cultural stresses. The commercial fishery began after the War of 1812. From 1820 to 1890 the catches increased at the rate of 20% annually as better transportation opened up new markets, and fishing technology improved. Lake trout, lake herring, and lake whitefish were the targets of the gill net fishery between 1850 and 1860. Lake sturgeon interfered with this fishery; the fishermen emphasized destruction of sturgeon (during their fishing operations) and this population was rapidly reduced to commercial insignificance. With better fishing gear, the populations of lake trout, followed by whitefish and lake herring, were also reduced to insignificance. With the decline of commercial fishing, government agencies in Canada and the states bordering the lake were established to cope with the problem. Fish hatchery techniques developed in France were adapted to stocking the lake, but they were unsuccessful.

Pollution from metropolitan, agricultural, and industrial sources has been the cause of eutrophication. However, the final collapse of the remaining dominant fish populations was caused by predation by rainbow smelt, cannibalistic activity of blue pike, and predation by other fish. All of these factors were intensified by the fisheries. Eutrophication was not the dominant stress, and the invasion of the sea lampreys did not cause serious losses.

Some headway is being made by government agencies toward regulating interboundary sources of pollution that are harmful to water quality and fish habitat. The current fishery management objective is the conservation of existing valued species and the possible replacement of species that have been severely reduced.
[2 figures, 29 references] SW

9.19

landfill may release mercury because of oxidation and leaching. Proper landfill design will reduce percolation, and the addition of long-chain alkyl thiols will prevent methylation and subsequent release of mercury. When dredging of a mercury-contaminated site is required, provisions should be made prior to the operation for adequate land disposal of the dredge tailings.
[21 figures, 28 tables, 22 references] SW

9.19 DETERMINATION OF BIOCHEMICAL OXYGEN DEMAND IN BIOCHEMICALLY PURIFIED WASTE WATERS OF THE PYARNU FISHERY

Shifrin, S. M., E. V. Porkhal, and E. M. Gur'yanova (U.S.S.R.)
Chemical Abstracts 78, No. 22, 140114a (June 4, 1973)

9.16

fertilization rate of her eggs, and a close relationship was found between viability of embryos and fat content of the muscle tissue of the female. In addition, a correlation was found between the age of the female and the rate of yolk consumption during growth of and resulting weight gain of the embryo. The rate of metabolic process was found to be highest in embryos from spawners of the medium sized group. The authors recommended that females 42-60 cm. in length and males 38-46 cm. in length should be used for artificial propagation of pike-perch.
[6 tables, 19 references] SW

9.19 COPPER INDUCED LESIONS IN ESTUARINE TELEOSTS

Gardner, George R., and Gilles LaRoche (Natl. Mar. Water Qual. Lab., U.S. Environ. Prot. Agency, West Kingston, R.I.)
Chemical Abstracts 78, No. 23, 144093r (June 11, 1973)

9.19 DDT: AN UNRECOGNIZED SOURCE OF POLYCHLORINATED BIPHENYLS

Maugh, Thomas H., II
Science 180, No. 4086, 578-579 (May 11, 1973)

Polychlorinated biphenyls (PCBs) are industrial chemicals, but they are ubiquitous in the biosphere. They resemble DDT in this respect. The author reviewed reports which indicated that the similarity in distribution of DDT and PCBs is not accidental. Two researchers, K. W. Moilanen and D. G. Crosby, reported to the 165th meeting of the American Chemical Society at Davis, Calif., in April 1973, that DDT vapor can be converted to PCBs by the same wavelengths of ultraviolet (UV) light found in sunlight of the lower atmosphere. They found that DDT was converted slowly to DDD and much more rapidly to DDE. Further irradiation by UV converted DDE to no less than nine other products including several PCBs. Other workers, A. R. Mosier, W. D. Guenzi, and L. L. Miller [Science 164, 1083 (1969)] reported the photochemical decomposition of DDT but at UV wavelengths not found in the lower atmosphere. Microorganisms in the soil convert DDT to DDE and DDD. M. M. Cliath and W. F. Spencer reported [Environ. Sci. Technol. 6, 910 (1972)] that 80% of the organochlorine chemicals in the air above a field that had been sprayed with DDT and then plowed consisted of DDE which is available for further photochemical degradation. The author states that there is little evidence to indicate whether environmental PCBs are enriched by the addition of less chlorinated isomers that would result from the photodegradation of DDT. K. W. Moilanen and D. G. Crosby expect to continue investigating the photochemical degradation of DDT for further confirmation of their initial finding that DDT in the environment is the source of PCBs.
[1 figure, 4 references] SW

9.19 ESTABLISHING SAFETY OF FEED ADDITIVES USED FOR PRODUCTION ENHANCEMENT

Goatcher, W. D., M. J. Norvell, D. A. Gable, and R. D. Williams (Bureau of Veterinary Medicine, Food and Drug Administration, Rockville, Md.)
Feedstuffs 45, No. 21, 47, 70 (May 21, 1973)

In demonstrating human safety of new animal drugs and feed additives, determinations for the amount of residues in the animal must be performed. If the drug or additive leaves a residue in the animal, toxicological studies must be made to provide data on the following: the metabolic fate and tissue depletion rates for the drug and its metabolites, acute oral LD_{50} tests, subacute oral toxicity tests, chronic oral toxicity tests, three generation studies, carcinogenicity studies, teratogenicity studies, mutagenicity studies, allergenicity studies, and drug interactions and enzyme induction studies. These tests are performed to determine the effect and no-effect level in two species of animals--a rodent and a nonrodent.

In general, the studies used to yield data in support of animal safety are the same as those used to demonstrate safety in humans.

Chemicals used in animals for production purposes have a significant ecological impact because they are consumed and voided extensively and continuously. Under provisions of the National Environmental Policy Act of 1969, an ecological impact statement will be required for new animal drug and feed additive applications. The influence on the environment of residues from feed additives may be studied at one or more time periods and locations, because residues and breakdown products may

9.19 RESIDUES OF DDT AND ITS DEGRADATION PRODUCTS IN COD LIVER FROM TWO NORWEGIAN FJORDS

Stenersen, J. (Norwegian Plant Protection Institute, 1432 As-NLH, Norway), and J. Kvalvag (Chemical Research Laboratory, Norwegian College of Agriculture, 1432 As-NLH, Norway)
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 120-121 (Aug. 1972)

This preliminary investigation was performed to determine if the use of DDT in agricultural operations results in residues in aquatic organisms. Cod were taken from a fjord bordered by intensive fruit production; and cod were taken from a fjord bordered by land where there was no fruit production. The livers of the fish were subjected to chromatographic techniques to determine the presence of DDT and its metabolites. The results indicate that the livers from cod caught in the fjord bordered by fruit production agriculture had 7.5 times more residues than livers from cod caught in the other fjord.
[1 figure, 1 table, 3 references] SW

9.19 METABOLISM OF DDT BY FRESH WATER DIATOMS

Miyazaki, S., and A. J. Thorsteinson (Dept. of Entomology, University of Manitoba, Winnipeg R3T 2N2, Canada)
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 81-83 (Aug.1972)

Reports of other workers indicated that dechlorination of DDT was accomplished by the metabolic activity of a yeast, a fungus, several actinomycetes, bacteria, and a marine diatom. The possibility that diatoms detoxify DDT in aquatic environments was also suggested.

The authors investigated the ability of freshwater diatoms to degrade DDT to DDE. Pure cultures of diatoms were isolated from a sample of ditch water. The pure unidentified diatom cultures and cultures of Nitzschia species (a trematode parasite of fish) were placed in separate flasks containing nutrient medium and a radioisotope of ^{14}C-DDT. The flasks were incubated in a shaker water bath at 20°-22° C. for 2 weeks. At the end of the period the mixtures of diatoms and culture medium were extracted with an n-hexane and ether mixture and filtered. The residual cells were extracted with acetone, and the extracts were combined with the n-hexane-ether extracts. The concentrated extracts were subjected to thin-layer chromatography.

The results indicate that DDE was the only metabolite of DDT. Further, the unknown diatoms were active in degrading DDT to DDE and more active than Nitzschia species in this regard. The authors concluded that some species of freshwater diatoms may be significant in the natural degradation of DDT.
[1 table, 13 references] SW

9.19 (1.37) ORGANOCHLORINE INSECTICIDE, HERBICIDE AND POLYCHLORINATED BIPHENYL (PCB) INHIBITION OF NaK-ATPASE IN RAINBOW TROUT

Davis, Paul W. (Dept. of Pharmacology, University of Washington, Seattle, Wash.), Jacqueline M. Friedhoff, and Gary A. Wedemeyer
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 69-72 (Aug. 1972)

Previous reports showed that organochlorine compounds inhibited the sodium and potassium ion-activated adenosinetriphosphatase (NaK-ATPase) in gill, brain, and kidney microsomes of rainbow trout. The authors examined the NaK-ATPase enzyme system in trout gill for toxic reactions to 14 chlorinated hydrocarbons, 2 PCBs, and 2 herbicides. NaK-ATPase activity was calculated as the difference between NaKMg-ATPase and Mg-ATPase values. The percent inhibition is shown in a table in the report listing all the compounds and the concentrations at which they were tested. The authors suggest that there are limits to relating in vitro enzyme inhibition to in vivo toxicity in fishes, and further studies of organopolychlor toxicity for the NaK-ATPase enzyme system should be interpreted with caution.
[1 table, 10 references] SW

9.19 METHYL MERCURY: ITS EFFECT ON EGGSHELL THICKNESS

Peakall, David B., and Jeffrey L. Lincer (Section of Ecology and Systematics, Cornell University, Ithaca, NY 14850)
Bulletin of Environmental Contamination and Toxicology 8, No. 2, 89-90 (Aug. 1972)

The eggshell thinning caused by DDT and its metabolites has been previously reported and is well known. The authors suggested that other widely dispersed materials, in appreciable concentration and capable of biological magnification (up the food chain), may also cause eggshell thinning. They selected mono- and dimethyl mercury for studies of effects on eggshell thinning. Eggs were collected from ring doves and American kestrels before and after they were exposed to the methyl mercuries. The shells of the dove's eggs were ashed rather than measured for thickness because they were small.

The results indicate that either form of methyl mercury had no effect on the eggshell thickness of the kestrels or the calcium content of the dove's eggs.
[1 table, 11 references]

SW

9.19 DESTRUCTION [sic] FISH CAUSED BY INDUSTRIAL POLLUTION

Rakaj, Ndoc (Inst. Stud. Proj. Ind., Univ. Shtetetor, Tirana, Albania)
Chemical Abstracts 78, No. 23, 144024u (June 11, 1973)

9.19 ANALYSIS OF A CHLORINATED TERPHENYL (AROCLOR 5460) AND ITS DEPOSITION IN TISSUES OF COD (GADUS MORHUA)
(1.51)

Addison, R. F. (Fisheries Research Board of Canada, Bedford Institute, Dartmouth, Nova Scotia, Canada), G. L. Fletcher, S. Ray, and J. Doane
Bulletin of Environmental Contamination and Toxicology 8, No. 1, 52-60 (July 1972)

A chlorinated terphenyl (or triphenyl or polphyenyl) was fed to codfish to determine its distribution in the tissues of the fish. Samples of tissue were homogenized in n-hexane and filtered. The hexane layer was recovered, evaporated, and reconstituted; an aliquot was applied to a column containing previously treated Florisil. Elution of the column with n-hexane brought off the chlorinated terphenyl (Aroclor 5460), PCBs, and some pp'-DDE. The Aroclor 5460 was estimated by gas-liquid chromatography and a pulsed electron capture detector.

In one experiment, 2 ml. of a herring oil containing 1 g. of Aroclor 5460 were fed to mature cod. After 1 week, the fish were killed and the tissues were analyzed for Aroclor 5460. In another experiment, a group of cod were fed the herring oil with Aroclor 5460. They were fed chunks of herring intermittently and killed at the end of a 70-day period. The tissues of these fish were analyzed also.

The results of the analyses show that all tissues of fish killed 1 week after ingesting Aroclor 5460 contained the compound. High levels were found in digestive tract organs, but the levels varied between fish. In the fish analyzed after 70 days, all tissues contained Aroclor 5460, but the levels were lower than in the fish killed 1 week after ingesting the compound. The authors suggest that the absorptive and excretory efficiency seemed poor.
[1 figure, 2 tables, 11 references]

SW

9.19

vary with time and location. The characteristics of residues to be considered include: toxicity, rate of input into the environment, persistence, tendency to concentrate at points in the environment, rate of uptake in biological systems, and magnification in the food chain. The authors believe that an ideal ecological policy should restrict the use of drugs or additives which present a definite threat to the environment yet not prevent the use of those which enhance food production.

SW

9.19 DISTRIBUTION OF DISSOLVED MERCURY IN THE IRISH SEA

Gardner, D., and J. P. Riley (Dept. of Oceanography, University of Liverpool, Liverpool L69 3BX, England)
Nature 241, No. 5391, 526, 527 (Feb. 23, 1973)

During Sept.-Oct. 1972, a survey was carried out of the distribution pattern of dissolved mercury in the Irish Sea. Excluding the coastal strip about 40 km. wide extending northwards from Anglesey, the dissolved mercury level of the Irish Sea ranged from 25 to 50 (average 32) ng. l^{-1}, except for the central area which ranged from 10 to 24 (av. 18) ng. l^{-1}. These values are similar to those found for the English Channel, the northern North Sea, and the Northeast Atlantic. Two areas in the eastern coastal strip showed dissolved mercury concentrations over 200 ng. $l.^{-1}$. Apparently, significant mercury pollution occurs in this area.
[2 figures, 10 references]

FTP

9.19 ICELANDIC GEOTHERMAL ACTIVITY AND THE MERCURY OF THE GREENLAND ICECAP

Siegel, B. Z. (Dept. of Microbiology) and S. M. Siegel (Dept. of Botany, University of Hawaii, Honolulu, HI 96822), and F. Thorarinsson (Division of Geosciences, Science Institute, University of Iceland, Reykjavik, Iceland)
Nature 241, No. 5391, 526 (Feb. 23, 1973)

Studies were made of the levels of mercury in the atmosphere over Iceland; analysis for mercury was by flameless atomic absorption. The authors found that the levels of mercury in the atmosphere over Icealnd varied greatly according to the site, but that several widely separated locations yielded mercury concentrations well above the range commonly cited for unpolluted air (0.001-0.010 $\mu g.m^{-3}$). In the Krýsuvik thermal area, duplicate analyses on each of four separate sample traps yielded a mean value of 11.3±1.8 $\mu g.\ m^{-3}$, and in the Westmann Islands area, five sites showed a mean mercury level of 2.4±0.8 $\mu g.\ m^{-3}$. Although mercury may be introduced into the atmosphere by degassing of fluid magmas, the authors suggest that release from fine ash could also serve as a vehicle. Long-range transport of volcanic ejecta from Iceland eastward to Europe and parts of Asia and Africa has already been established. Effluents from Iceland to Greenland would be transported by prevailing winds and by North Atlantic gales (which are commonly associated with eastward moving cyclones and sustain a westerly circulation in their northern sectors).
[1 figure, 10 references]

FTP

9.19 HYDROCARBONS AND POLYCHLORINATED BIPHENYLS FROM THE UNSAPONIFIABLE FRACTION OF ANHYDROUS MILK FAT

Flanagan, Vincent P., and Aldo Ferretti (Dairy Products Laboratory, Agricultural Research Service, U.S. Dept. of Agriculture, Washington, DC 20250)
Journal of Lipid Research 14, No. 3, 306-311 (May 1973)

Previous studies have demonstrated the presence of hydrocarbons in milk fat and anhydrous butter oil. These compounds include the normal C_1 to C_{48} alkanes, some of their 2-methyl and 1-cyclohexyl derivatives, mono- and diolefins, branched-chain alkanes, alkynes, alkyl-substituted benzenes, and squalene. The purpose of the present study was to unequivocally establish the presence of hydrocarbons in the unsaponifiable fraction of anhydrous milk fat. The hydrocarbons were isolated and analyzed by GLC, and the column effluent was fast scanned with a mass spectrometer. Examination was also made for polychlorinated biphenyls.

The presence of 39 aliphatic hydrocarbons was firmly established in the unsaponifiable fraction of anhydrous milk fat. These were the C_{14} to C_{27} and the C_{29} to C_{31} straight-chain paraffins, their monoolefin analogs, and the C_{25} to C_{29} branched alkanes. Phytene, 3,7,11,15-tetramethyl-n-hexadec-2-ene, was isolated and identified by high-resolution mass spectrometry and infrared analysis. The hydrocarbon level in the milk fat amounted to 30 p.p.m. Polychlorinated biphenyls were also present in trace amounts and were detected in the area of the chromatogram between the C_{18} and C_{23} hydrocarbons.

The origin of the hydrocarbons in milk fat is not clear. Some of them may be heat produced, but the mechanism of their formation is not known.

9.19 GEOGRAPHIC DIFFERENCES IN PHYTOPLANKTON SENSITIVITY TO PCBs

Fisher, Nicholas S., Linda B. Graham, and Edward J. Carpenter (Biology Dept., Woods Hole Oceanographic Institution, Woods Hole, MA 02543), and Charles F. Wurster (Marine Sciences Research Center, State University of New York, Stony Brook, NY 11790)
Nature 241, No. 5391, 548-549 (Feb. 23, 1973)

Other researchers have postulated that organisms adapted to stable, "predictable" environments are, in general, more sensitive to environmental stress than are organisms adapted to "unpredictable" surroundings. Because experimental evidence for this hypothesis is lacking, the present authors studied the toxicity of PCBs to three species of diatoms. The clones of diatoms isolated from the relatively stable Sargasso Sea waters were compared with those isolated from fluctuating estuarine environments. The species of diatoms studied were Thalassiosira pseudonana, Fragilaria pinnata, and Bellerochia sp. For each clone, three cultures were grown in medium containing 10 parts per billion (p.p.b.) of PCBs (Aroclor 1254), and three cultures (controls) were grown in medium without PCBs. The cultures were sampled after 0, 47.5, 70, 95, and 118 hr. and measured for the growth of the clones. The data are shown in the table that follows. Growth of all seven clones diminished in the presence of PCBs, but the isolates from the Sargasso Sea were consistently more sensitive than those from the estuaries and the continental shelf. The authors suggest that the estuarine-coastal phytoplankton may be better equipped to survive abiotic environmental stress than are those from the open ocean.
[1 figure, 1 table, 15 references]

9.2 (1.0117)(1.85) A STOCHASTIC INVESTMENT MODEL FOR A SURVIVAL CONSCIOUS FISHING FIRM

Thompson, Russell G., Richard W. Callen, and Lawrence C. Wolken (Quantitative Management Science, University of Houston)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 112-120.

In this study, the stochastic investment model for a survival conscious firm developed by Thompson and George (1970) is extended to take into account income taxes and depreciation of the capacity. This model is applied to shrimp fishing on the Texas Gulf coast. Values of the parameters, as in the deterministic application by Thompson et al. (1970), were based on proprietory information, current market conditions, and present institutional restrictions. The effect of growth in real per capita income on shrimp prices is estimated, and two different rates of income growth are analyzed. Solutions to six problems based on two different sets of random sequences are computed and discussed. The results indicate the effect of the survival constraint on investment decisions, and the importance of revealed information in decision making.
[3 tables, 3 references, appendix] Authors' abstract

9.2 (1.85) THE U.S. SHRIMP INDUSTRY: PAST TRENDS AND PROSPECTS FOR THE 1970'S

Whitaker, Donald R. (Fishery Products Research and Inspection Division, NOAA, National Marine Fisheries Service, Washington, DC 20235)
Marine Fisheries Review 35, Nos. 5-6, 23-30 (May-June 1973)

The U.S. shrimp industry has expanded rapidly during the last two decades and is expected to continue growing during the 1970's. Production has grown in recent years because of rapidly increasing catches of northern shrimp. Total production likely will continue upward, but not as rapidly as in recent years. Most, if not all, of the increase will come from northern shrimp landings. Per capita consumption of shrimp has doubled. Total consumption of shrimp is expected to expand during the 1970's but whether it will expand at a faster rate than the population will depend on discoveries of new resources around the world. Demand for quality and demand for increased services are expected to rise.
[6 figures, 2 tables, 2 references] Author's abstract

9.19

Clones species source	Ratio of (cell density of treated culture): (cell density of control)				
	After 0 hr.	After 47.5 hr.	After 70 hr.	After 95 hr.	After 118 hr.
T. pseudonana					
Estuarine	1.00	0.694	0.365	0.676	0.976
Estuarine	1.00	0.544	0.368	0.520	0.844
Oceanic	1.00	0.422	0.241	0.172	0.341
F. pinnata					
Estuarine	1.00	0.824	0.909	0.932	0.590
Oceanic	1.00	0.688	0.707	0.269	0.387
Bellerochia sp.					
Estuarine	1.00	0.207	0.064	0.036	0.035
Oceanic	1.00	0.074	0.020	0.013	0.005

FTP

9.19

The detection of PCB in milk fat was unexpected. Even though they were present in trace amount, the authors believe that their detection emphasizes the widespread contamination of our environment.
[3 figures, 18 references]

FTP

9.19 MERCURY AND FOOD CHAINS

Jernelov, Arne (Inst. Water Air Pollut. Res., Stockholm, Sweden)
Chemical Abstracts 78, No. 9, 53542v (Mar. 5, 1973)

9.2 (1.0113)(1.30) AUGMENTATION OF SALMON STOCKS THROUGH ARTIFICIAL PROPAGATION: METHODS AND IMPLICATIONS

Stevens, Joe B. (Dept. of Agricultural Economics, Oregon State University, Corvallis, Oreg.), and Bruce W. Mattox (University of Rhode Island, Kingston, R.I.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 133-145.

Eighty-one hatcheries on the Pacific Coast now rear significant numbers of salmon and steelhead for sport and commercial fisheries. Annual operation and maintenance costs amount to $6.6 million. A production function analysis of 15 Oregon Fish Commission hatcheries produced tentative conclusions that (a) controlled inputs were combined in fixed proportions, (b) constant returns to size were realized, and (c) some degree of factor substitution existed between the controlled "fixed proportion input" and water temperature. The latter relationship may allow hatchery managers to improve efficiency at the hatchery level. Uncertainty with respect to downstream environmental conditions, however, must be considered along with returns to size for the hatchery production function when new investments are undertaken.

Fixed asset theory was used to conceptualize exit and entry of salmon harvesting resources between 1947 and 1966. Net entry followed years of good catches, but net exit did not occur following the bad years. If a major objective of hatchery programs is to augment fishermen's incomes, consideration must be given to increasing the opportunity costs of extant resources as well as to limiting entry of new resources.
[4 figures, 5 tables, 13 references]

Authors' abstract

9.2 (9.3) ON THE UTILITY OF BIOECONOMIC MODELS FOR FISHERIES MANAGEMENT

Pontecorvo, Giulio (Graduate School of Business, Columbia University, New York, N.Y.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 12-22.

Short run and long run biological and economic models are inevitably bound together in any comprehensive plan to manage commercial fisheries. While these disciplines can be treated rigorously, political and social considerations can be considered only generally and therefore on an ad hoc basis. Within this framework long run models are useful primarily for goal setting. More work must be done in developing short run models which will measure the immediate biological and economic impacts of alternative management steps in addition to immediate political and social ramifications. Emphasis would then be placed upon the economic sources of short run instability, with an initial economic rationalization of the fishery providing the funds for subsequent management and biological forecasting which will concentrate on extending management from a rationalized fishery at a given harvesting level to rationalized fishing at some optimum level.
[15 references]

Author's abstract

9.2 (1.013)(1.21) OPTIMAL FISHING EFFORT IN THE PERUVIAN ANCHOVETA FISHERY

Segura, Edilberto L. (Bailey, Tondu, Warwick and Company, Ltd., New York, N.Y.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 57-64.

This paper introduces a new approach to measuring technical change, increased skills of the skipper and the fishermen, water temperature, etc., to obtain a better measure of fishing effort and therefore a revised estimate of the optimum quantity to be landed. The revised technique used adjusts the level of landings to an index rather than the level of fishing effort, indicating the level of landings that would have resulted in previous periods if the current landings/effort relationship is used.

The revised yield/effort relationship which results yields 16.2 million ton-trips as the optimal fishing effort, as opposed to the 23 million ton-trips which were obtained without this measure of technical change.

[3 figures, 1 table, 5 references] Author's abstract

9.2 (9.3) NATURAL RESOURCES AND EXTERNAL ECONOMICS: REGULATION OF THE PACIFIC HALIBUT FISHERY

Rich, Jack (Dept. of Economics, Oregon State University, Corvallis, Oreg.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 65-71.

In a static, long run competitive equilibrium framework, a catch function allowing for short run diminishing returns is combined with a fish growth function developed by Pella and Tomlinson which facilitates the derivation of an expression for the long run marginal cost of "effort" in a common property resource such as a fishery. This expression takes into account both "congestion" and "growth" costs. The diagramatic technique of Crutchfield and Zellner is modified to take account of these externalities. The modified Crutchfield-Zellner diagrams are used to illustrate the potential economic losses from maximum sustainable yield regulation or other nonoptimal output.

[5 figures, 7 references] Author's abstract

9.2 (1.0154)(1.0120) LIMITED ENTRY: THE CASE OF THE JAPANESE TUNA FISHERY

Keen, E. A. (California State University, San Diego, CA 92115)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 146-158.

Limited entry has been advocated strongly as an important but as yet unused management tool for U.S. fisheries. Japan has maintained a policy of limiting entry into its high seas fisheries since 1949 and thus has considerable experience of potential value to the use of this tool in U.S. fisheries. This paper presents an assessment of the limited entry system as it has been developed for the Japanese tuna fisheries. Attention is given to effects on the acquisition of capital and overall allocation of national resources, specific effects on the size and nature of the fleet, pressures to permit additional entry, and effects on the location of shore-based activities. Special attention is given to problems that were unforeseen at the time of the initiation of limited entry that, with experience, could have been avoided. The paper is based largely on field research conducted in 1963 and 1964.

[3 figures, 8 references] Author's abstract

9.3 MANAGING OUR COASTAL ZONE

(Authors and titles listed below)
Proceedings of a Conference on Coastal Zone Management, Feb. 20-21, 1973. Sponsored by the New York State Sea Grant Program, Albany, N.Y., 78 pp. Price not given.

This report is divided into three parts. The first part contains the addresses, the second part summarizes the results of the workshop sessions, and the third part is a list of participants. The addresses were:

"The Keynote Address," by Perry B. Duryea (New York State Assembly), pp. 3-5.
"The Coastal Zone - Semantics and Definitions," by Donald F. Squires (New York State Sea Grant Program), pp. 7-11.
"Coastal Zone Legislation in the States," by Marc J. Hershman (Coastal Resources Law, Sea Grant Legal Program, Louisiana State University), pp. 13-19.
"Policy Alternatives for Coastal Zone Management," by Richard R. Gardner (Office of Coastal Zone Management, NOAA, U.S. Dept. of Commerce), pp. 21-24.

The workshops dealt with two major areas: (1) Critical issues for the coastal zone and (2) Implementation of coastal zone planning and management. FTP

9.2 (1.0115) (1.5)(1.120)

CROSS SECTION PRODUCTION FUNCTIONS FOR NORTH ATLANTIC GROUNDFISH AND TROPICAL TUNA SEINE FISHERIES

Carlson, Ernest W. (Economic Research Laboratory, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Washington, D.C.)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 42-56.

This paper explores the use of cross section production functions to estimate the fishing power of individual vessels. The problems addressed are: The proper measurement of output, the measurement of technological change, and the effect of location, crew size and important vessel characteristics.

Regression analysis upon data from the North Atlantic groundfish fishery and the tropical tuna seine fishery yielded highly significant results. Many of the hypothesized relationships are measurable and stable with relatively small errors. The tests indicate that: there are better measures of output than total pounds; fishing time is measured better using days absent rather than days fishing; the use of more vessel characteristics improves explanatory power; crew size can be an important variable; the effects of location can be measured; and technological change can be measured.

The production functions measured can then be used as inputs in devising management schemes.

[3 tables, 7 references, 4 appendixes] Author's abstract

9.3 (9.2)

THE ECONOMIC ZONE IN THE LAW OF THE SEA: SURVEY, ANALYSIS AND APPRAISAL OF CURRENT TRENDS

Johnston, Douglas M., and Edgar Gold
Occasional Paper No. 17, Law of the Sea Institute, University of Rhode Island, Kingston, RI 02881 (June 1973), 53 pp.

The economic zone proposal is a plan to establish an extensive maritime zone beyond the 12-mile territorial limits within which the coastal state would exercise national jurisdiction (either exclusive or preferential rights and sole or special responsibility) with respect to the resources and related activities within the zone. In practice, it appears that the economic zone proposals are an effort by developing countries to establish a high degree of control over the offshore resources under a single, multipurpose regime. In theory, economic zone proposals may represent an attempt to find an acceptable compromise between extensive territorial claims and extensive functionalist counterclaims to maritime jurisdiction. The economic zone concept thus appears to be quasi-territorial and quasi-functionalist.

Part one of this paper is a discussion of the claims to the economic zone and considers the definition of the economic zone, the evolution of the concept of the economic zone, and the characteristics of the claims to the economic zone. Part two is a discussion of the claim and counterclaim process and deals with the classification of the claimants and counterclaimants, the trends in the interaction of claims and counterclaims, and dynamics of the third United Nations Law of the Sea Conference diplomacy. Part three is a projection appraisal of the outcome of the trends of the Conference.

[49 footnotes] FTP

9.2

PRODUCTION FROM THE SEA

Bell, Frederick W. (Economic Research Division, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Washington, DC 20235), Ernest W. Carlson, and Frederick V. Waugh
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 72-91.

The sea constitutes a common property resource which causes factor productivity to be heavily influenced by technological externalities. The sea is also subject to the spectre of Malthusian scarcity since man cannot manipulate the ocean environment (Barnett and Morse, 1963). We estimated the parameters using ordinary least squares of the dynamic Schaefer production model of the intervention of man into the oceanic ecosystem. A second production model for the sea to specify diminishing returns to capital and labor for any fixed biomass was developed. The parameters of the latter model were estimated by a computer search technique. The results indicate that the industry production function for marine life is subject to diminishing physical returns to capital and labor. For the cases considered in this study it also appears that the parabolic yield function developed by Schaefer, assuming constant returns to factors inputs, is not as realistic as a production function with diminishing returns to inputs with a given biomass.

[9 figures, 5 tables, 14 references, appendix] Authors' abstract

9.2

THE BUDGET'S NEW CLOTHES -- A CRITIQUE OF PLANNING-PROGRAMMING-BUDGETING AND BENEFIT-COST ANALYSIS

Merewitz, Leonard, and Stephen H. Sosnick
Markham Publishing Co. (3322 W. Peterson Ave.), Chicago, IL 60659 (1971), 318 pp. Price $10.95 ($5.95 paper [cover])
George E. Lamp, Jr. (reviewer)
Engineering Economist 18, No. 2, 137-138 (1973)

Although the Federal government no longer requires all elements of PPB (Planning, Programming, and Budgeting) in the decision making process, the reviewer believes this book should still be of value and interest to all who are concerned with government or other organization expenditure decisions and in PPB as a budgeting process, particularly because the book discusses both the positive and negative sides of PPB. Furthermore, the authors suggest that some attention be given to the negative aspects of PPB before expensive decisions to proceed are made.

The book contains 12 chapters covering the following subject areas: Historical review of PPB; Program accounting; Multi-year costing; Description and measurement of activities; Zero-based budgeting; Quantitative evaluation of alternatives; Time, interest, and uncertainty with regard to capital expenditures; "Efficiency benefit"; Objectives of the government; Project outlays, opportunity costs, associated costs, social costs, and alternative costs; History of benefit-cost analysis of two large government projects; and Summary and conclusions. The book is amply referenced. Some knowledge of economic concepts is essential. FTP

9.6 FISHERY PUBLICATIONS, CALENDAR YEAR 1968: LISTS AND INDEXES

Engett, Mary Ellen, and Lee C. Thorson (Scientific Publications Staff, National Marine Fisheries Service, Seattle, WA 98105)
NOAA Technical Report NMFS CIRC-380, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105 (May 1973), iv + 24 pp.

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (until October 1970 the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service) in calendar year 1968 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: Circular, Data Report, Fishery Industrial Research, Fishery Leaflet, and Special Scientific Report--Fisheries.
[1 figure] Authors' abstract

9.6 FOOD SANITATION
(2.01)(2.05)

Guthrie, Rufus K. (in collaboration with Frank D. Borsenik, Glenn V. Brauner, and W. J. Harper)
Avi Publishing Co., Inc., Westport, Conn. (1972), 247 pp. Price not given.

This book covers the field of food sanitation and emphasizes applied microbiology as the foundation for good practices. Four chapters are given to an explanation of sanitary science and its relation to microorganisms and food. The concept of sanitation is expanded to cover undesirable chemicals and food in another chapter. Sanitation is applied, in individual chapters, to the use of water in the food industry, food processing, dairy food plants, food canning plants, and food preparation and service. The appendix contains a tabulation of common infectious diseases--food borne and air borne. Another section contains selected representative laws and codes regulating food industries. In addition, federal, state, county, and city health codes (recognized and recommended) are included. The book also contains bibliographies for each chapter, an index, and a glossary of terms. SW

9.6 FISHERY PUBLICATIONS, CALENDAR YEAR 1969: LISTS AND INDEXES

Thorson, Lee C., and Mary Ellen Engett (Scientific Publications Staff, National Marine Fisheries Service, Seattle, WA 98105)
NOAA Technical Report NMFS CIRC-379, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105 (Apr. 1973), iii + 31 pp.

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (until October 1970 the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service) in calendar year 1969 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: Circular, Data Report, Fishery Industrial Research, Fishery Leaflet, and Special Scientific Report--Fisheries.
[1 figure] Authors' abstract

9.7 DIRECTORY OF MARINE SCIENCE EDUCATION 1973

Schweitzer, James P. (Dept. of Marine Sciences, Louisiana State University) (compiler)
Center for Wetland Resources, Louisiana State University, Baton Rouge, LA 70803 (May 1973), 46 pp. Price $2.00.

The number of marine science programs in high schools, middle, and elementary schools probably exceeds 1,000, with an annual rate of increase of about 20%. This directory provides a national listing of marine science teachers in precollege education. With this directory, teachers can become apprised of others having an interest in this field, and thus they can correspond with them to share ideas, experiences, and teaching materials. The directory is divided into two parts; part I lists marine science teachers and part II lists other marine science education specialists coordinators, consultants, and those persons who could be of help to schools in establishing a marine science education program. The directory also contains some information on the nature of the individual marine science programs. FTP

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

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0.110 (9.11) RAPID ASSESSMENT OF OCEAN ENVIRONMENT AIDED BY NEW SHIPBOARD STD DIGITIZER-COMPUTER INTERFACE

Ingraham, W. James, Jr., and C. J. Bartlett (National Marine Fisheries Service, Northwest Fisheries Center, Seattle Laboratory, Seattle, WA 98112)
Marine Fisheries Review 35, No. 7, 10-14 (July 1973)

As part of the new NMFS Marine Resources Monitoring Assessment and Prediction (MARMAP) Program, oceanographers are searching for key measurements to assist them in providing forecasts of the fisheries. One problem confronting these oceanographers is the rapid, accurate assessment of the ocean environment.

A recent development of interest is the linking of a Plessey Environmental Systems STD (salinity-temperature-depth) data acquisition system to a Digital Equipment Corporation PDP-8 computer aboard the NMFA Northwest Fisheries Center's RV George B. Kelez. This involves installation of a digitizer-interface unit and has been accomplished and field-tested by personnel of the Center's Oceanography Program. Because this unit may become standard equipment aboard NMFS research vessels, a complete description is presented here.

Since the origin of reversing water bottles, salinity and temperature measurements at depth have been obtained by positioning several of these bottles (with precision reversing thermometers attached) along a cable at various depths in the ocean. Discrete water samples thus obtained were analyzed for salinity by chemical titrations or, more recently, by electronics (laboratory) salinometers. The details in the temperature and salinity structure with depth depended upon the number of Nansen bottles used. This time-consuming method has recently been supplemented by electronic sensors attached to conductor cables which, as they are lowered into

0.35 (9.19) COMPLEX EQUILIBRIA INVOLVING DDT AND MODEL COMPOUNDS FOR PHOSPHOLIPID AND PROTEIN

Wilson, Nancy K., and William E. Wilson (National Institute of Environmental Health Sciences, P.O. Box 12233, Research Triangle Park, NC 27709)
Science of the Total Environment 1, No. 3, 245-251 (Nov. 1972) (Elsevier Publishing Company, Amsterdam, Netherlands)

The pesticide DDT [1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane] is widely distributed in the environment, occurs in human adipose tissue, and is toxic. The mode of toxicity of DDT has not been unequivocally established, but it appears to alter nerve membranal properties and to inhibit membranal ($Na^+ + K^+$)ATPase activity. The present study was carried out to obtain a better understanding of the molecular interaction capabilities of DDT.

Equilibrium constants and values of the thermodynamic parameters for the formation of complexes between p,p'-DDT and compounds containing biologically significant functional groups were obtained by proton magnetic resonance. The results seem to indicate that the phospholipid phosphate and ester groupings and aromatic substituents in protein are the most likely important binding sites for DDT which might underlie its inhibitory effects on enzyme activity.
[2 figures, 1 table, 22 references] FTP

0.32 PRESENCE AND THERMOSTABILITY OF CALCIUM-BINDING PROTEINS IN THE INTESTINAL AND BRANCHIAL MUCOUS MEMBRANES OF VARIOUS TELEOSTS

Chartier Baraduc, Marie Madeleine (Lab. Physiol. Etres Mar., Inst. Oceanogr., Paris, France)
Chemical Abstracts 78, No. 23, 145399g (June 11, 1973)

0.35 LIPID AND FATTY ACID COMPOSITION OF FROG PHOTORECEPTOR OUTER SEGMENTS

Mason, W. T. (Dept. of Chemistry, Case Western Reserve University, Cleveland, OH 44106), R. S. Fager, and E. W. Abrahamson
Biochemistry 12, No. 11, 2147-2150 (May 22, 1973)

The rod outer segment is the primary photopic receptor of the vertebrate retina. The rods are highly organized stacks of flattened saccules surrounded by a plasma membrane. The rod outer segments are connected to the remainder of the cell body containing the energetic and synaptic machinery of the cell. The disk-like membranes of the rod contain the photosensitive visual pigment rhodopsin. It is likely that the lipid of the membrane plays an important role in the visual excitation process.

The frog retina has been the single most important tissue used in the biochemical and physiological studies of the visual process. In the present study, frog rod outer segments were purified by density gradient centrifugation and were examined to determine their phospholipid and neutral lipid content and the respective fatty acid profiles of these classes.

The frog photoreceptor outer segment membranes contained large amounts of palmitic (16:0), stearic (18:0), linolenic (18:3), and docosahexanoic (22:6) acid. They contained a relative abundance of glycolipid (25% of the total lipid) and a small amount of cholesterol (2%). The photoreceptor membrane is composed of protein (61%) and lipid (39%); rhodopsin was 27% of the total lipoprotein of the membrane (dry weight basis). The predominant phospholipid components of the rod segments

0.321 (0.6) GEL FRACTION FROM FISH MUSCLE EXTRACT. IV. MYOSINLIKE PROTEIN IN GEL FRACTION FROM FROZEN-STORED MUSCLE

Umemoto, Shigeru, and Koichi Kanna (Coll. Agric. Vet. Med., Nihon Univ., Tokyo, Japan)
Chemical Abstracts 78, No. 11, 70395s (Mar. 19, 1973)

0.33 (3.249) CHANGE IN LIPIDS AND PROTEINS IN THE MUSCLES OF MIRROR CARP DURING FREEZING AND COLD STORAGE

El-Bastavizi, Mohamed A., and G. A. Smirnova (Mosk. Inst. Nar. Khoz. im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 78, No. 7, 41712n (Feb. 19, 1973)

0.35

were phosphatidylcholine (45%), phosphatidylethanolamine (26%), phosphatidylserine (15.1%), and sphingomyelin (6.4%).

The five major fatty acid components detected (namely, palmitic, stearic, linolenic, docosanoic, and docosahexanoic acid) in the frog disk membranes show an accumulation of shorter chain fatty acids in the metabolic pathway rather than the preferential completion of the pathway to docosahexanoic acid found in the bovine rod outer segment membranes. Also, the frog disk membranes were found to be unlike invertebrate (squid) rhabdomes in this metabolic preference for fatty acid buildup. The authors indicate that the characteristics of the frog visual pigment membrane system make it appear likely that the fluidity of the lipid region facilitates molecular motion of the chromoprotein.
[3 tables, 26 references] FTP

0.34 (0.5) A NOVEL ANTIBIOTIC FROM A SPONGE OF THE GENUS VERONGIA

Andersen, Raymond J., and D. John Faulkner (Scripps Institution of Oceanography, La Jolla, CA 92037)
Tetrahedron Letters, No. 14, 1175-1178 (1973)

A new antibiotic was extracted from a species of sponge of the genus *Verongia* with ethanol and was purified by florisil chromatography. The antibiotic had the molecular formula $C_{11}H_{15}NO_4Br_2$. It appears to be derived from an intermediate compound by the addition of ethanol during the extraction process.
[11 references] FTP

0.110 (9.11)

the sea, give continuous analog graphical traces of the temperature and salinity profiles vs depth on recorders in the vessel's laboratory.

This analog system provides a visual display which allows oceanographers to easily locate and follow discrete strata or ocean fronts which may influence the distributions of the plankton or fish. Unfortunately, the time and personnel available for accurate analyses of data during field operations is usually limited and the extraction and correction of specific values of temperature and salinity from these graphs are not only time consuming and laborious but limit the analyses which may be done at sea. Conversion of the analog signals to digital format and processing them by computer eliminates manual processing and permits additional analyses such as field of density and geostrophic ocean currents. The method of digitizing the signal from the Plessey Environmental System's Model 9006 or 9040 STD and interfacing the unit with a PDP-8 computer is described in the article.
[5 figures, 1 table] Reprinted in part

0.35 APPLICATIONS OF ^{13}C NUCLEAR MAGNETIC RESONANCE IN BIOCHEMISTRY

Gray, G. A. (Varian Associates, Eastern Regional Applications Laboratory, Springfield, N.J.)
Critical Reviews in Biochemistry 1, No. 2, 247-304 (1973)

This review covers the progress in the applications of ^{13}C nuclear magnetic resonance (NMR) in biochemistry in the past several years. This is the first time such information has been collected in one publication. Some basic background on ^{13}C NMR and the new techniques useful for it are given. Techniques are described, such as various types of decoupling, fourier transform NMR, selective enrichment, and spinlattice relaxation, in conjunction with relevant biochemical applications. The specific topics considered include carbohydrates, steroids, alkaloids, natural products, biosynthetic pathways as deduced by specific enrichment of nutrients, nucleosides and nucleotides, amino acids, peptides, polypeptides, antibiotics, proteins, enzymes, biopolymers, heme globins, corrinoids, relaxation interpretation, phospholipids, and membrane structures.
[42 figures, 175 references] FTP

0.33 DENATURATION OF FISH PROTEIN BY DRYING. IV. PREVENTIVE EFFECT OF AMINO ACIDS AND OXY ACIDS

Kanna, Koichi, Kiyonari Kakuda, and Masahiro Sakuraba (Coll. Agric. Vet. Med., Nihon Univ., Tokyo, Japan)
Chemical Abstracts 78, No. 11, 70363e (Mar. 19, 1973)

0.36
(0.38)

ENZYMES IN FACULTATIVE ANAEROBIOSIS OF MOLLUSCS--I. MALIC ENZYME OF OYSTER ADDUCTOR MUSCLE

Hochachka, P. W., and T. Mustafa (Dept. of Zoology, University of British Columbia, Vancouver 8, British Columbia, Canada)
Comparative Biochemistry and Physiology 45, No. 3B, 625-637 (July 15, 1973)

II. BASIC CATALYTIC PROPERTIES OF PHOSPHOENOLPYRUVATE CARBOXYKINASE IN OYSTER ADDUCTOR MUSCLE

Mustafa, T., and P. W. Hochachka, ibid., pp. 639-655.

III. PHOSPHOENOLPYRUVATE CARBOXYKINASE AND ITS ROLE IN AEROBIC-ANAEROBIC TRANSITION

Mustafa, T., and P. W. Hochachka, ibid., pp. 657-667.

During anoxia in facultative anaerobic molluscs, such as oysters, glucose is metabolized to succinate and alanine (not to lactate as in anoxic vertebrate tissues). Two questions remain outstanding regarding this metabolic conversion: (1) What is the biological significance of this kind of metabolic organization? and (2) What are the precise metabolic pathways involved? The first question was considered by the authors in an earlier report [Science 178, 1056-1060 (1972)]. In part I, they consider the functional properties of malic enzyme in the adductor

0.39
(1.87)

CAROTENOID PIGMENTS OF SPINY LOBSTER

Matsuno, Takao, Takahisa Kusumoto, Tetsuo Watanabe, and Yasuro Ishihara (Kyoto Coll. Pharm., Kyoto, Japan)
Chemical Abstracts 78, No. 17, 108477k (Apr. 30, 1973)

0.39
(1.21)
CAROTENOID PIGMENTS OF JAPANESE ANCHOVY
Matsuno, Takao, Toshiko Akita, and Michiko Hara (Kyoto Coll. Pharm., Kyoto, Japan)
Chemical Abstracts 78, No. 17, 108478m (Apr. 30, 1973)

0.38
(1.37)

TRIGLYCERIDE HYDROLYSIS BY THE PANCREATIC LIPASE SYSTEM OF TROUT (SALMO GAIRDNERI). DETECTION OF A NEW TYPE OF SPECIFICITY OF ACTION

Leger, Claude, Dominique Bauchart (Inst. Natl. Rech. Agron., Cent. Natl. Rech. Zootech., Jouy-en-Josas, France)
Chemical Abstracts 78, No. 11, 68591j (Mar. 19, 1973)

0.38
(6.32)
PEROXIDASE FROM THE RED ALGA CYSTOCLONIUM PURPUREUM
Murphy, M. J., and C. Ohlocha (Dep. Biochem., Univ. Coll., Galway, Ireland)
Chemical Abstracts 78, No. 11, 68600m (Mar. 19, 1973)

0.4
(6.31)

MODEL WHICH GENERATES RED TIDES

Wyatt, T., and J. Horwood (Ministry of Agriculture, Fisheries, and Food, Fisheries Laboratory, Lowestoft, Suffolk, England)
Nature 244, No. 5413, 238-240 (July 27, 1973)

The order Dinoflagellata contains species of free swimming algae which commonly cause what are known as red tides. Species of Trichodesmium are also associated with the phenomenon. Many of these algae produce poisons which are destroyed or diluted as rapidly as they are excreted, and the environment they inhabit remains harmless. However, under certain conditions not yet understood, the algae and the toxic excretions become abundant causing a red tide. The red tide, if prolonged, may be followed by a mass kill of fish and other organisms. Other reports indicated conditions that frequently precede red tide outbreaks; heavy rainfall, calm sunny weather, and an influx of estuarine waters resulting in a meeting of dissimilar water masses. These conditions promote a reduction in vertical mixing rates of the water column which allows the motile algae to concentrate more easily in preferred layers of water for optimal reproduction. The migration of these algae to a restricted part of the water column is accompanied by a release from grazing pressure by zooplankton. In addition, the nonmotile phytoplankton, unable to migrate to the preferred layers of the water, will be subject to increased grazing pressure by the zooplankton. Thus the motile species, released from grazing pressure and under conditions for optimal reproduction, could become dominant. Under these relatively pure culture conditions, the color of the colony changes from green to yellow, amber, brown, or red. Continuation of such

0.38 THERMOSTABILITY OF SOME MITOCHRONDRIAL ENZYMES OF LOWER VERTEBRATES. II. GENERAL SURVEY

Smith, C. L. (Dep. Zool., Univ. Liverpool, Liverpool, England)
Chemical Abstracts 78, No. 17, 107766s (Apr. 30, 1973)

0.4 (6.31)

growth causes either depletion of nutrients or limitation of light due to the density of algal growth. Either condition leads to the termination of reproduction and death of the algae. Toxins released by the dead cells, followed by decay and oxygen depletion, could result in the poisoning and death of neighboring fish and other organisms.

The author has constructed a mathematical model which related the appearance of red tides to the following factors: swimming speed of dinoflagellates, reproductive rate of phytoplankton, number of zooplankton grazers, grazing rate, light radiation, and vertical stability of the water column. The model is a mathematical expression of the hypothesis that, given the presence of the red tide organisms, they will become more abundant with increasing vertical stability of the water mass. The predictability of the model has not yet been tested.
[2 figures, 10 references] SW

0.36 (0.38)

muscle of the Pacific oyster (Crassostrea gigas). Parts II and III deal with the properties of phosphoenolpyruvate carboxykinase in the adductor muscle of the oyster and its potential role in the aerobic-anaerobic transition.
[Part I: 5 figures, 3 tables, 16 references; Part II: 9 figures, 3 tables, 19 references; Part III: 6 figures, 17 references.] FTP

0.39 MEASUREMENT OF CIRCULATING THYROXINE IN SEVERAL FRESHWATER TELEOSTS BY COMPETITIVE BINDING ANALYSIS

Higgs, D. A., and J. G. Eales (Dep. Zool., Univ. Manitoba, Winnipeg, Manitoba, Canada)
Chemical Abstracts 78, No. 17, 108480f (Apr. 30, 1973)

0.4
(0.6)

THE ACCEPTABLE DAILY INTAKE OF FOOD ADDITIVES

Bigwood, E. J. (Food Law Research Centre, Institute of European Studies, University of Brussels, Brussels, Belgium)
Critical Review in Toxicology 2, No. 1, 41-93 (1973)

During the past 15 years the Joint FAO-WHO Expert Committee on Food Additives has evaluated the acceptable daily intake of more than 200 food additives. This work is of major importance in the field of the national and international public health policies concerning the control of the use of food additives and, consequently, the control of food quality. The present review is an analysis of the work done by the Committee.
[8 references]

FTP

0.5
(2.05)

INCIDENCE OF SALMONELLAE IN COMMERCIALLY PREPARED SANDWICHES FOR THE VENDING TRADE

Khan, N. A., and T. A. McCaskey (Dept. of Animal and Dairy Sciences, Auburn University, Agricultural Experiment Station, Auburn, AL 36830)
Journal of Milk and Food Technology 36, No. 6, 315-316 (June 1973)

A survey was made to determine the incidence of salmonellae in sandwiches prepared in commercial kitchens for distribution through vending machines. A total of 646 sandwiches of 13 different types from vending machines and from the kitchens of five distributors were examined. Salmonellae organisms were not found in any of the sandwiches. The authors concluded that the routine use of mayonnaise and other acid ingredients along with the proper maintenance of hygienic conditions and the effective temperature control of vending machines were important in the prevention of Salmonella infection in commercially prepared sandwiches.
[1 table, 9 references]

FTP

0.5
(2.05)

VIRUSES IN FOODS

Potter, Norman N. (Dept. of Food Science, Cornell University, Ithaca, NY 14850)
Journal of Milk and Food Technology 36, No. 6, 307-310 (June 1973)

Viruses are subcellular entities with structure, organization, and size comparable to that of large molecules. They can be introduced into specific living cells and will reproduce only inside such cells. The intimate association of virus and host cell results in an alteration of or ultimate destruction of the host cell.

Many virus-food interrelationships are not yet understood; thus assessment of the health hazard from several foodborne viruses cannot be made. Comparatively little research is being carried out on viruses in foods. Many technical difficulties hinder progress in this field such as problems in epidemiological recognition, methods of virus detection and identification from foods, and the sometimes long incubation periods required that make problematic the conclusive relation between disease and a given food.

This article, a review of the pertinent literature on viruses in foods, contains a discussion of some of the problems inherent in studies of viruses in foods and points out several areas where research is needed.
[30 references]

FTP

0.5
(1.953)

NEISSERIA SPECIES ISOLATED FROM DOLPHINS

Vedros, Neylon A., Phyllis I. Warren (Naval Biomedical Research Laboratory, University of California, Berkeley, CA 94720), and D. G. Johnson
Journal of Wildlife Diseases 9, No. 3, 241-244 (July 1973)

The authors are participating in long-term studies of the total microbial profile of marine mammals in their natural habitat and of the changes that occur when they are brought into contact with man and other animals and when placed in isolation under husbandry conditions. In the course of these studies, swabbings from different areas of the bodies of 35 wild dolphins were cultured in various media for isolation and identification. The dolphins(Lagenorhynchus obliquidens and Delphinus bairdi) were brought aboard ship by divers and within 10 min the swab samples were obtained; the animals were then returned to the ocean. Only five of the bacterial isolates were gram-negative, oxidase positive, diplococci. These cultures were isolated from the blowhole of two female L. obliquidens and the blowhole, mouth, and throat of three D. bairdi females. The colonial morphology and production of acid in media containing 1% carbohydrate narrowed the isolate cultures to one of three species of chromogenic Neisseria, that is, N. mucosa, N. sicca, or N. perflava. The dolphin isolates were able to reduce nitrates with the production of gas, the most critical biochemical reaction used to identify the prototype N. mucosa. Serology and pathogenicity for mice were also similar. The authors concluded that the dolphin isolates can best be classified as N. mucosa var. heidelbergensis. This organism was found to be present in the nasopharynx of

0.3 EFFECT OF TEMPERATURE AND pH ON GROWTH AND ENTEROTOXIN PRODUCTION BY STAPHYLOCOCCUS AUREUS

Scheusner, D. L., L. L. Hood, and L. G. Harmon (Dept. of Food Science and Human Nutrition, Michigan State University, East Lansing, MI 48823)
Journal of Milk and Food Technology 36, No. 5, 249-252 (May 1973)

The purpose of this study was to determine the effect of temperature on the growth and enterotoxin production of four immunologically different strains of S. aureus and the effect of pH on production of enterotoxin B by S. aureus strain 243. The four strains of S. aureus used and the type of enterotoxin they produce are: 265 (type A), 243 (B), 493 (C), and 315 (D). The four strains were incubated at temperatures ranging between 7° and 50° C. At 45° C all strains grew and produced enterotoxin except strain 243; there was a decrease in viable cells of this strain and no enterotoxin (type B) was produced. All strains grew and produced enterotoxin when incubated in the range of 19° to 39° C. Strains 265, 243, and 493 grew at 13° C, but only strain 243 produced enterotoxin (type B). It appears that the pH ranges for growth and enterotoxin production by S. aureus strain 243 are probably similar in broth and food. If this is true, the data suggest that foods within the pH range of 5.1 to 9.0 and which contain S. aureus strain 243 may be considered to have potential for food poisoning if other environmental conditions are favorable.
[3 tables, 18 references] FTP

0.4 (1.3)(9.1) EVIDENCE FOR PHEROMONE-INFLUENCED HOMING BY MIGRATING ATLANTIC SALMON, SALMO SALAR (L.)

Solomon, D. J. (Salmon and Freshwater Fisheries Laboratory, Whitehall Place, London SW1A 2HH, England)
Nature 244, No. 5413, 231-232 (July 27, 1973)

Early reports indicated conclusively that olfaction in Pacific salmon causes homing to the stream of their birth. Other reports indicated that the homing of adult salmonids may be influenced by pheromones or chemicals secreted by a specific fish population. The author suggests that the presence of salmon parr in a river causes its estuary to attract migrating adults, and the metabolic products excreted by the young salmon could be the attractant to which the adults home. The author cites as evidence reports of an attempt to establish salmon in a tributary of the Parrett River which empties into the Bristol Channel. In the years following the hatching of the eggs, the number of salmon caught in the Parrett River estuary increased several fold. Most of the catch did not originate from the newly established fishery; by previous tagging they were found to originate from three other salmon rearing rivers. The author believes that these fish found the nonhome river attractive because of the presence of the pheromone excreted by the young salmon lying in the upper reaches of the tributary river.
[2 figures, 19 references] SW

0.5 (1.953)

48 out of 100 healthy human individuals tested; in addition, it has been implicated as the etiological agent of pneumonia in children. The probable route of transmission is through the respiratory tract. The authors suggest that this information should be considered by those investigators who work very closely with dolphins in their husbandry and training programs.
[2 tables, 4 references] SW

0.5 BEHAVIOR OF MARINE MICROFLORA TOWARDS ANTIBIOTICS. I. SENSITIVITY TOWARDS CHLORTETRACYCLINE (CTC)

Surendran, P. K., and K. Mahadeva Iyer (Cent. Inst. Fish. Technol., Ernakulam, India)
Chemical Abstracts 79, No. 3, 13963x (July 23, 1973)

0.5 MECHANISM OF THERMAL DEATH OF BACTERIAL SPORES: ELECTRON-MICROSCOPIC OBSERVATIONS

Prokop, A. (Dept. of Technical Microbiology, Institute of Microbiology, Czechoslovak Academy of Sciences, Prague 4, Czechoslovakia), and A. E. Humphrey (Biochemical Engineering Laboratory, University of Pennsylvania, Philadelphia, Pa.)
Folia Microbiologica 17, No. 6, 437-445 (1972). Distributed by Academic Press, Inc., 24-28 Oval Road, London NW17 DU, England)

The thermal death rate of vegetative microorganisms is described by a logarithmic curve. In contrast, the death rate of bacterial spores is nonlogarithmic. A possible mathematical model for this nonlogarithmic death rate involves an intermediate state in which the spores are viable but have been made thermally susceptible by the initial heating. The authors investigated the intermediate state by observing cytological changes in the spores for evidence to corroborate the mathematical model. Spores of Bacillus stearothermophilus (FS 7954) were exposed to thermal shock as follows: 100° C for 5 min; 110° C for 4 min; 110° C for 10 min; and 110° C for 30 min.

Morphology of the spores, during the early heat exposure, remained unchanged from the initial state. Some changes were observed in the laminated inner-coat layer of the spore. This layer is reported to consist of keratin fibrils. These fibrils were observed to contract upon heating which causes, it is believed, some water to be expelled from the spore protoplast. The authors suggest that this contraction enhances the thermal resistance of the spore and accounts for the nonlogarithmic death curve. On prolonged heating, the death of the spore occurs with the loss of the coat integuments and protoplast envelopes.
[2 figures, 4 tables, 31 references] SW

0.6 (9.6) PROCEEDINGS OF THE 25TH ANNUAL SESSION MIAMI, FLORIDA, NOVEMBER, 1972, GULF AND CARIBBEAN FISHERIES INSTITUTE

Higman, James B. (editor)
University of Miami, Rosenstiel School of Marine and Atmospheric Science, Gulf and Caribbean Fisheries Institute, Coral Gables, Fla. (May 1973), 184 pp. Price not given.

The proceedings were divided into four sessions, and each session was devoted to a major topic. The conference was opened with an address by the Honorable Thomas N. Downing, House of Representatives; the subject was on the trends in U.S. fishery policy. The major topic of the first session was territorial seas. Six papers were presented dealing with the law of the sea relative to fisheries, agreements between the United States and Brazil and the Guianas on their shrimp fisheries, and the Mexican view of her coastal seas.

The second session covered food technology and fisheries management. The papers dealt with international standards and nutritional labeling of fishfood products, defrosting shrimp, and quality control of shrimp. The last paper in this group covered State and Federal management of coastal fisheries.

The next session was devoted to reports of research supported entirely or in part by the National Sea Grant Program of NOAA. The first five papers covered technical subjects: estimating abundance of fish from egg and larval counts in the Gulf of Mexico, migration of spiny lobsters, a longline retrieval system, quality control of fish products, and processing sanitation relative to bacterial levels in blue crab. The last paper in this session was a discussion of the necessity for complete utilization of fish in food production.

0.7 THE SELENIUM DILEMMA

Scott, M. L. (Dept. of Poultry Science and Graduate School of Nutrition, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 103, No. 6, 803-810 (June 1973)

Selenium is an essential nutrient, and at low levels in the diet it prevents death from deficiency in a variety of species. At high levels in the diet, selenium is extremely toxic and may be carcinogenic. Selenium was discovered by the Swedish chemist J. J. Berzelius more than 150 years ago [Schweigger J. 21, 1818-23 (1817)]. Its toxicity was demonstrated in 1934 when K. W. Franke [J. Nutr. 8, 597-608 (1934)] indicated that high levels of selenium in plant foodstuffs were responsible for alkali disease in cattle. The nutritional requirement for selenium is in the range of 0.1 to 0.3 p/m. It is, however, extremely toxic; levels of selenium in the range of 2 to 10 p/m cause chronic toxicity, and levels above 10 p/m produce drastic changes that result in sudden death.

Furthermore, the studies reported suggest that selenium has an inhibitory effect on cancer produced by various carcinogens. It appears that the evidence indicating a carcinogenic effect of high doses of selenium is open to question. [36 references] FTP

0.7 CONVERSION OF ARGININE TO PROLINE IN THE CHICK

Austic, R. E. (Dept. of Poultry Science and Graduate School of Nutrition, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 103, No. 7, 999-1007 (July 1973)

Studies were conducted to determine whether the conversion of arginine to proline may occur in the young chick. Feeding a diet devoid of proline resulted in a growth depression which could not be relieved by dietary supplements of arginine or ornithine. In two experiments using arginine-5-^{3}H, however, it was found that chicks which were fed the proline-free diet converted a portion of the dietary arginine directly to proline. Approximately 7% of the arginine from the basal diet containing 1.0% arginine was converted to proline by chicks fed the proline-free diet. This represented on a molar basis most of the arginine which was catabolized, as estimated from urea excretion. It is concluded that the chick can convert arginine directly to proline, but that the amount of proline synthesized in this manner represents but a small part of the total amount of proline needed for growth. [1 figure, 6 tables, 39 references] Author's abstract

0.7 (6.19) 1973 FEEDSTUFFS ANALYSIS TABLE

Hubbell, Charles H.
Feedstuffs 45, No. 30, 28-29 (July 23, 1973)

The table is published annually; it is a summary of the latest analyses of various feed ingredients. For each ingredient, the content of protein, fat, fiber, calcium, phosphorus, and ash are given. Concentrations (milligrams per pound) of three essential growth factors are given: riboflavin, niacin, and pantothenic acid. In addition, the content (in percent) of the amino acids arginine, lysine, methionine, cystine, tryptophan, and glycine in each ingredient is given. Concentration of choline is also shown. Magnesium, potassium, and sulfur content of selected feedstuffs are shown. The ingredients listed include grains, oil seed meals, fish meal, alfalfa, and whey; and byproducts of distilleries, fruit processors, and meat packers. SW

0.7 INTERACTION OF DIETARY FLUORIDE AND MAGNESIUM IN GUINEA PIGS

O'Dell, B. L., R. I. Moroni, and W. O. Regan (Dept. of Agricultural Chemistry, University of Missouri, Columbia, MO 65201)
Journal of Nutrition 103, No. 6, 841-850 (June 1973)

Weanling male guinea pigs were fed a magnesium-deficient diet (25 p/m) based on EDTA-treated soybean protein, to which graded levels of magnesium and fluoride were added as supplements in an attempt to determine the nature of the physiological interaction of the two elements. A 100 p/m level of fluoride in the diet was the most efficacious in the stimulation of growth, prevention of mortality and prevention of kidney calcification. When magnesium was severely limiting, 200 p/m F was toxic and caused lameness and swollen feet; adequate magnesium largely overcame the deleterious effect. Fluoride (100 ppm) decreased from 1,600 to 600 p/m the dietary magnesium concentration required to support the maximum growth rate. At the lower level of dietary magnesium, fluoride supplementation resulted in higher plasma magnesium concentration, but the increase was not sufficient to restore the elevated level of plasma inorganic phosphorus to normal. Fluoride tended to increase rather than decrease plasma phosphate. The increase in plasma magnesium could not be explained by an effect of fluoride on bone magnesium. Fluoride had no effect on the rate of release of magnesium from bone in magnesium-deficient guinea pigs. Fluoride spares magnesium in the guinea pigs and it is postulated to do so by activating a catalyst jointly with magnesium.
[7 figures, 2 tables, 13 references] Authors' abstract

0.7 DIGESTIBILITY OF PROCESSED FEEDLOT MANURE

Ward, Gerald M., and David K. Beede (Colorado State University, Ft. Collins, Colo.)
Feedstuffs 45, No. 28, 25 (July 9, 1973)

The appearance of larger feedlots for beef production has brought about the problem of disposing of large concentrations of cattle manure. The accumulations of manure are increasing because restrictions by some states have been imposed on the amount and time manure may be used to fertilize land; and commercial fertilizer is considered to be more valuable for crops than manure. To solve the problem, schemes for using manure or fractions of manure in feeds have been proposed.

In one method, manure from penned Hereford steers was used. The manure was mechanically separated into two fractions: (1) a washed, fermented solid fraction of about 50% dry matter, and (2) a fraction representing the residue. The first fraction was evaluated in this study. With the addition of 5% (by weight) dried molasses, the dried material was allowed to ferment in plastic bags for 3 days. The resultant product had the aroma and consistency of good quality corn silage. A digestion trial of the product was conducted with six crossbred lambs, averaging 61 lb in weight, over a 9-day period. No other feed was given. The results indicate that the average dry matter digestibility was 76%, and the average total digestible nutrients were 77 lb per 100 lb of dry feed. The protein intake of the lambs would not support weight gains, but the results show that the lambs maintained weight during the trial. The product was readily eaten by the lambs and it was shown to be highly digestible. In a small-scale trial, cattle on starting feed were found to eat the product readily when fed a conventional starting ration containing corn silage.
[3 tables, 6 references] SW

0.6 (9.6)

The last session dealt with fisheries and estuaries. Six papers were presented: two were related to Venezuela--the status of the fisheries and the biology of the pink-spotted shrimp. Other papers covered stackable fish traps for offshore fishing; pollutants and aquaculture; new ideas in coastal waters in relation to sport and commercial fisheries; and a marine sport fish statistical program. SW

0.7 CADMIUM TOXICITY IN GROWING SWINE

Cousins, R. J., A. K. Barber, and J. R. Trout (Rutgers University, State University of New Jersey, New Brunswick, NJ 08903)
Journal of Nutrition 103, No. 7, 964-972 (July 1973)

The purpose of this study was (1) to characterize in growing swine the syndrome manifested by exposure to graded levels of dietary cadmium, (2) to quantitate as a function of dose the ability of the tissues of swine to retain cadmium, and (3) to determine the effect of dietary cadmium on the formation of renal cadmium-binding protein.

"Cadmium (Cd) as cadmium chloride was added to the basal diet of 8-week-old swine at levels of 0, 50, 150, 450 and 1,350 p/m for a 6-week comparison period. Growth rate was decreased as a function of Cd level, having ceased in the 1,350 p/m group. Hematocrit values were the most sensitive measurement of toxicity and were decreased in all Cd-fed animals. Serum phosphorus was decreased in animals receiving 450 and 1,350 p/m Cd, while serum calcium was not affected by Cd intake. Bone ash content was decreased as a function of Cd intake. Leucine aminopeptidase (LAP) activity was depressed in renal cortex from the groups receiving 150 p/m Cd or more, but serum LAP was unaffected by Cd intake. The kidney, liver, spleen and teeth contained the highest concentrations of Cd. Kidney Cd increased with dietary Cd level but appeared to reach a near maximal level in the 450 and 1,350 ppm Cd groups. This renal Cd content was directly related to the level of cadmium-binding protein isolated from kidney cortex by gel filtration chromatography."
[2 figures, 6 tables, 30 references] [First paragraph of this abstract is an abstract of part of the introduction of the article; the second paragraph is the authors' abstract.]

0.6 UNCONVENTIONAL SOURCES OF FISH PROTEIN
(8.)(6.15)(6.54)

Oiley, June (Tasmanian Reg. Lab., CSIRO, Hobart, Australia)
Chemical Abstracts 78, No. 17, 109336a (Apr. 30, 1973)

.7 A CONSPECTUS OF RESEARCH ON CALCIUM REQUIREMENTS OF MAN

Irwin, M. Isabel (Nutrition Institute, Agriculture Research Service, U.S. Dept. of Agriculture, Beltsville, MD 20705), and Eldon W. Kienholz (Dept. of Avian Science, Colorado State University, Fort Collins, CO 80521)
Journal of Nutrition 103, No. 7, 1019-1095 (July 1973)

The purpose of this survey was to show what work has been done, how the work was done, and where the greatest need for research lies. The reports covered by the review have been restricted to those on human studies dealing with the requirements for calcium and with factors affecting those requirements.

The ability of populations in different geographic areas to live in apparent health with widely different calcium intakes makes food intake studies of little value in assessing calcium requirements or calcium nutriture. The studies do indicate the diversity in human subjects and thus point out some of the problems involved in attempting to make estimates of calcium requirements of general applicability. A major impediment to the determination of the calcium requirements for man is the lack of a clear-cut calcium deficiency syndrome. Perhaps more information on calcium metabolism, how it functions in maintaining tonicity of muscles, clotting of the blood, and neural irritability and on how calcium is laid down structurally, might help in devising clinical tests that could indicate calcium nutritional status. Use of isotopic studies with animals may be a logical approach in obtaining the necessary information on calcium nutriture and calcium requirements and in developing the research methods. Much more work is needed on rates and patterns of calcification during childhood in order to accurately assess the

1.22 (1.014) NAHRUNGSÖKOLOGISCHE UNTERSUCHUNGEN AN HERINGSLARVEN (STUDIES ON FEEDING ECOLOGY OF HERRING LARVAE)

Schnack, Dietrich (Institut für Meereskunde an der Universität Kiel, Kiel, Germany)
Berichte der Deutschen Wissenschaftlichen Kommission für Meeresforschung 22, No. 3 (1972) (Hamburg, Germany)

Studies of the gut content of herring larvae, taken from the northwestern North Sea (Aberdeen Bank) and the Schlei Fjord (Western Baltic Sea), were conducted to compare feeding conditions in these two nursery areas. In addition, studies were conducted on the food supply and the vertical distribution of the larvae.

The results indicate that the North Sea area larvae had a high rate of starvation, as suggested by estimates of digestion rate and food requirements. In comparison, optimal feeding conditions were found in the Schlei Fjord in May but not June. Furthermore, the food supply was found to be optimal at about 200 food organisms of preferred size per liter. Concentrations above or below this level caused a reduction in the amount of food found in the herring larvae.

The vertical distribution of herring larvae was found to be dependent on light and temperature but not on the distribution of plankton. Selection of food organisms by the herring larvae was dependent on size or visibility of the prey. Efficiency of feeding may be reduced by selection of less digestible organisms such as gastropods and nauplii.

[31 figures, 15 tables, 131 references] SW

1.01 (9.4) REVIEW OF FISHERIES IN OECD MEMBER COUNTRIES 1972

Anonymous
Organization for Economic Co-operation and Development, Paris, France (1973), 248 pp. Price $5.00, £1.76, F20, Sw.fr. 15.60, DM 12.50. Available from OECD sales agents. In the United States: OECD Publications Center, Suite 1207, 1750 Pennsylvania Ave., N.W., Washington, DC 20006.

This report contains brief reviews of the fisheries in 1972 in each of the OECD countries. The country members are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States. FTP

2.00 POSTMORTEM QUALITY CHANGES IN ICED PACIFIC SHRIMP (PANDALUS JORDANI)

Flores, Sergio C., and David L. Crawford (Dept. of Food Science and Technology, Oregon State University Seafoods Laboratory, Astoria, OR 97103)
Journal of Food Science 38, No. 4, 575-579 (May-June 1973)

Considerable work has already been carried out on the quality changes that take place in ice-stored Gulf of Mexico shrimp. The present study, therefore, was carried out with Pacific shrimp and involved the determination of the postmortem biochemical changes that take place in stored iced Pacific shrimp and an evaluation of the relationship between these changes and the quality of the cooked product. Freshly caught shrimp were held in ice in a storage room kept at 1°-2° C. Samples for testing were taken at the beginning of the experiment and on each of the 8 days of the test period. The shrimp were analyzed for pH, microbial numbers, total and nonprotein nitrogen, tyrosine content, carotenoid pigment content, proteolytic and polyphenolase enzyme activities, and levels of trimethylamine oxide, trimethylamine, dimethylamine, and formaldehyde. Apparently, the chemical changes were mediated by a combination of bacterial action and endogenous enzyme activity, although the washing action of melting ice could have played a major role. Flavor of the cooked shrimp decreased progressively over the 8-day period. The dimethylamine and formaldehyde levels of the shrimp progressively increased during the storage period.

[4 figures, 2 tables, 47 references] FTP

0.7 (9.6) WORLD REVIEW OF NUTRITION AND DIETETICS, VOL 16, FOOD, NUTRITION AND HEALTH

Rechcigl, M. (editor)
Published by Albert J. Phiebig, Inc., U.S. Representative of S. Karger, P.O. Box 352, White Plains, NY 10602 (1973), 511 pp. Price $55.80.
Paul A. Lachance (Dept. of Food Science, Rutgers University) (reviewer)
Food Technology 27, No. 8, 78-79 (Aug. 1973)

This comprehensive treatise on nutrition should be useful to the food technologist knowledgeable in nutrition. The various chapters were written by authorities in their fields. The subjects of the chapters are: "Nutrition in Early Childhood"; "Nutrition During Pregnancy"; "Nutrition and Aging . . ."; "Nutrition and Physical Performance"; "Nutrition and Behavior and Learning"; "Nutrition and Disease"; "Undernutrition"; "Overnutrition"; "Nutrition and Infection"; "Nutrition and Oral Problems"; "Prospects for Improving World Food Supplies and Nutrition"; "Food Habits, Food Faddism, and Nutrition"; "Nutrition in Food Processing"; "Food Additives"; "Food Safety and Food Poisoning"; and "Reviews Relating to Food, Nutrition and Health." FTP

2.01 (0.5) IDENTIFICATION AND CHARACTERIZATION OF THE MICROFLORA AND SPOILAGE BACTERIA IN FRESHWATER CRAYFISH PROCAMBARUS CLARKII (GIRARD)

Cox, N. A., and R. T. Lovell (Dept. of Food Science, Louisana State University, Baton Rouge, LA 70803)
Journal of Food Science 38, No. 4, 679-681 (May-June 1973)

Freshwater crayfish are now an important food product in south Louisiana and other gulf coast areas. They are marketed as chilled peeled tails. The purpose of the present study was to identify the bacteria present on commercially peeled crayfish tails after various periods of chilled storage, and then to determine which bacteria are responsible for spoilage of the crayfish meat. Crayfish tails were obtained from two commercial plants in south Louisiana; one lot was stored at 0° C and the other at 5° C. At the beginning and after various periods of storage up to 24 days, bacteria were isolated from the peeled tail meats, identified generically, and subsequently classified on the basis of their ability to produce spoilage characteristics in sterile crayfish tail meat. The predominant species of microorganisms in the fresh crayfish tail meat were Micrococcus, Staphylococcus, Alcaligenes, and Achromobacter. Species of Achromobacter were predominant during early storage of the crayfish tails, and species of Pseudomonas and Achromobacter were predominant in the spoiled flesh. Two hundred bacterial isolates were made; of these, 22.1% were classified as "rapid spoilers"; 16.4% were "slow spoilers"; and 61.5% were considered "nonspoilers." Most of the organisms classified as spoilers were species of Pseudomonas, but some species of Achromobacter also belonged to this group.
[5 tables, 12 references] FTP

.7

calcium requirements for growth. Little information is available on the physiological changes that take place during puberty, pregnancy, lactation, and menopause. Much more information is needed on causative factors and on the metabolic and physiological changes involved in osteoporosis. Also, information is needed on the availability and utilization of calcium from diets eaten in areas where milk is not customarily consumed.
[527 references, 5 appendix tables] FTP

1.0161 WSTĘPNA ANALIZA SKŁADU I WYSTĘPOWANIA PRZYŁOWU NIERYBNEGO UŻYTKOWEGO NA ŁOWISKACH AFRYKAŃSKICH W ROKU 1971 [PRELIMINARY STUDIES ON THE COMPOSITION AND OCCURRENCE OF USEFUL NON-FISH CATCHES ON THE AFRICAN FISHING GROUNDS IN 1971]

Seidler, Wiesław (Zespół Wiedzy Rybackiej)
Zeszyty Naukowe, No. 1, 131-144 (Feb. 1973) (Wyższa Szkoła Morska w Szczecin, Poland) [In Polish; English summary]

Cephalopods constituted the primary components of the nonfish catches by Polish vessels operating from the Cap Blanc area in 1971; they amounted to about 0.3 to 0.4% of the total catch. Small amounts of crustaceans, dolphins, tortoises, and snails were also caught. The Polish catch of cephalopods amounts to about 200-300 tons per year and their commercial utilization may be possible.
[4 figures, 1 table, 6 references] FTP

0.6 (3.3) EFFECT OF SOME TECHNOLOGICAL FACTORS ON THE COLOR OF TOMATO SAUCE IN CANNED FISH PRODUCTS

Khristoferzen, G. S., and E. N. Butenko (Azovo-Chernomorsk. Nauchno-Issled. Inst. Morsk. Rybn. Khoz. Okeanogr., U.S.S.R.)
Chemical Abstracts 78, No. 11, 70428e (Mar. 19, 1973)

2.05 (1.81) EFFECT OF TEMPERATURE ON VIBRIO PARAHAEMOLYTICUS IN OYSTERS AT REFRIGERATOR AND DEEP FREEZE TEMPERATURES

Thomson, W. K., and C. L. Thacker (Health Protection Branch, Dept. of National Health and Welfare, Ottawa, Ontario, Canada)
Canadian Institute of Food Science and Technology Journal 6, No. 3, 156-158 (July 1973)

V. parahaemolyticus, a microorganism that causes food poisoning, has been isolated from shellfish and other marine sources. Another report indicated that 22% of shellfish sampled from Canadian Atlantic coastal areas contained this microorganism. Earlier reports indicated that the organism could not survive temperatures ranging between -18° and -34° C. An investigation was performed to determine the viability of the microorganism at -20° C.

Three strains of V. parahaemolyticus were used in the study: strain K4, strain Yanagisawa from a human patient, and strain T249 isolated from shellfish. The media used in the study included: (1) homogenized shucked oysters, (2) homogenized oyster-NaCl-peptone, and (3) NaCl-peptone without oysters. The media were sterilized by gamma irradiation (2.5 megrads) after being tubed. About 5×10^4 cells of each actively growing strain of V. parahaemolyticus were inoculated in each set of media; two tubes of each set were incubated at 0°, 4°, 8°, 10°, 12°, and -20° C. Survival of the strains was determined for each temperature by counting colonies on bromothymol blue Teepol agar-plated at the time of inoculation of the tubes and at weekly intervals. Frozen cultures were thawed, diluted serially tenfold, and plated in triplicate.

2.05 (0.5) SALMONELLA AND THE FOOD INDUSTRY--METHODS OF ISOLATION, IDENTIFICATION, AND ENUMERATION

Litchfield, John H. (Battelle-Columbus Laboratories, Columbus, Ohio)
Critical Reviews in Food Technology 3, No. 4, 415-456 (June 1973)

Salmonella organisms are frequently found in food products of animal origin; turkey and chicken were implicated in 36% of the foodborne outbreaks of salmonellosis reported in 1971. This review contains a discussion of the various procedures and their advantages and limitations for isolating, identifying, and enumerating Salmonella in foods. Also considered are some of the methods for rapid detection of Salmonella (such as enrichment serology and fluorescent antibody techniques). Apparently, none of the rapid methods can be substituted completely for conventional-cultural methods in isolating and identifying Salmonella in foods.

In spite of improvements in the sanitary quality control of foods, outbreaks of salmonellosis attributed to food sources still occur. Under provisions of the Federal Food, Drug, and Cosmetic Act, foods containing Salmonella are considered adulterated. Thus, the food industry must determine the presence of Salmonella in raw materials and finished products rapidly and economically, and with a high degree of reliability. The final results depend upon the selection of suitable samples from a lot that will assure a high probability of detecting Salmonella if they are present. From a statistical standpoint, attributes or variables sampling plans should be used to assure proper selection of samples. Samples must be subdivided and dispersed in the diluent to break up clumps of food (that may trap Salmonella) without reducing the viability of the organism.

2.06 SMOOTH, WHITE SPREAD FROM SEPARATED FISH FLESH FORMS A BASE FOR FLAVORED DIPS, SNACK ITEMS

Patashnik, M., G. Kudo, and D. Miyauchi (National Marine Fisheries Service, NOAA, Pacific Fishery Products Technology Center, Seattle, WA 98102)
Food Product Development 7, No. 6, 82, 87, 89, 91 (July-Aug. 1973)

Using black rockfish (Sebastes flavidus and S. brevispinis), a bland, unflavored fish spread base was produced that had a smooth texture, appealing white color, and excellent stability. The meat is removed from the fish or fish trimmings by means of a commercial fish-flesh separator. The fish spread base formulation is shown in the table that follows. Approved food additives may be used to enhance or modify the flavor of the base. With slight modification of the ingredients the base may be used to prepare dips or fried snack items. Scallop-flavored spread may be prepared by adding 0.3 parts of commercial scallop flavor, 2.1 parts sugar, and 0.0065 parts dimethylsulfide, and substracting 2.4 parts of fish flesh from the base ingredients. Chive-flavored spread may be prepared by adding 0.25 parts freeze-dried chives and substracting 0.3 parts of water from the base formulation. Smoke-flavored spread may be prepared by adding 0.0022 parts rose-pink food-grade dye, 0.06 parts paprika, 0.25 parts tomato paste, 0.22 parts liquid smoke, and 0.10 parts meat flavor intensifier, and substracting 1.55 parts of water from the base formulation. The spreads are heat pasteurized (by use of steam or water at 185° F so that the product in the container's slowest heating point is 180° F for at least 30 min).

2.06 (2.3) CRUSTACEAN PROCESSING

Taiyo Fishery Co. Ltd. (pat.)
Japanese Patent 73/0060
Food Technology 27, No. 8, 82 (Aug. 1973)

The extract liquor from crustaceans (such as lobsters) is concentrated at low pH and reduced pressure to prepare a product useful for soup bases. FTP

2.05 (0.5)

The author states that the conventional procedures of the Food and Drug Administration and the Association of Official Analytical Chemists give the greatest certainty of isolation and identification of Salmonella in food. He points out the need, for economic reasons, for the development of greater automation in Salmonella methodology and greater sensitivity of detection of small numbers; progress so far in these areas has been slow.
[13 tables, 261 references] FTP

2.05 (0.5)

The three strains in the three media at 0°, 4°, and -20° C showed none or few viable cells after 2 weeks. The few viable cells were found most often in the 3% NaCl-peptone medium. This suggested that the undiluted homogenized oyster was a less nutritious substrate for the organism than NaCl-peptone. At 8° C, multiplication of all strains did not occur in homogenized oyster medium; however, multiplication occurred in the two other media.

The authors suggest that freezing might be a useful method to reduce the numbers of cells in contaminated oysters. In addition, oysters may be stored safely by refrigeration at 0° to 8° C, particularly if they are to be consumed raw. Storage of oysters contaminated with V. parahaemolyticus in refrigerators having temperatures of 10° or 12° C.could be hazardous (if they are to be consumed raw).
[4 tables, 11 references] SW

2.06 BEEFISH PATTIES

King, Frederick J. (National Marine Fisheries Service, Fishery Products Technology Center, Gloucester, MA 01930), and George J. Flick
Marine Fisheries Review 35, No. 7, 31-33 (July 1973)

At present, ground meat can be obtained from fish frames or headed, gutted fish but it is underutilized in existing seafood products. Trying a different approach, we mixed it with ground beef and seasoning, in varying proportions, to make beefish patties.

Sensory evaluations indicated that beefish patties are just as acceptable as all-beef patties in appearance, odor, flavor and texture. Economic and nutritional considerations were not part of these evaluations but these factors would influence final consumer acceptance. The potential value of this new product suggests the desirability of expanding further development work.
[1 figure, 2 tables, 3 references] Authors' abstract

2.06

Ingredients of fish spread base		Amount of ingredient in percent to prepare pasteurized fish spread
Item	Function of item	
Fish flesh, finely minced	Nutritional base, emulsifier, and texture	65.0
Oil	Texture, lubricity, whiteness, carrier for surfactants	18.0
Water	Spreadability, texture	8.0
Phosphate-modified starch	Freeze-thaw syneresis, texture	5.0
Corn syrup solids	Texture, flavor	2.0
Salt	Solubilize protein, texture, and flavor	1.1
Monosodium glutamate	Flavor intensifier	0.5
Sodium tripolyphosphate	Water-holding capacity	0.15
Potassium sorbate	Mold inhibitor	0.10
Ribotide [1]	Flavor enhancer	0.05
Span 80	Lipophilic surfactant	0.035
Tween 80	Hydrophilic surfactant	0.035
Papain	Spreadability, texture	0.003

[1] 1:1 mixture of disodium inosinate and disodium guanylate.

[1 figure, 3 tables, 4 references] FTP

2.112 (2.1471) AN EFFECTIVE COMBINATION TRAWL FOR WEST COAST DRAGGERS: ATLANTIC-WESTERN TRAWLS

Fisher, R. Barry (Dept. of Fisheries and Wildlife, Oregon State University) Station Bulletin 613, Agricultural Experiment Station, Oregon State University, Corvallis, Oreg. (July 1972), 24 pp.

A combination trawl that can harvest flatfish and roundfish is needed for otter trawlers. In this bulletin, the author describes the modification, rigging, and fishing of a combination otter trawl on the coast of Oregon by several otter trawlers. The trawls were designed by Wes Johnson (Industrial Development Service, Dept. of Forestry and Fisheries, Ottawa, Ontario, Canada) and were modified and rigged by Fred Anderson (Fishing vessel Betty A, Charleston, Oreg.) and the author. The trawls used were four-seam box trawls with considerable overhang or apron. They were made of polyethylene webbing. The author found by experience that the trawls were superior to the traditional trawls currently used by Oregon draggers. The appendixes show the plan and details of the otter trawls.
[2 figures, 9 appendixes] FTP

2.1121 TRAWLING NET

Golubev, V. A., V. V. Maksimov, P. T. Mikhailov et al. ("Murmanseld" Herring Fleet Control of North Basin Fishing Ind. (pat.)
U.S.S.R. Patent 354,822
Soviet Inventions Illustrated (Derivent Publications Ltd., Rochdale House, 128 Theobalds Rd., London WC1 XRP, England), Section III. Mechanical & General, May Week IV, pp. x2-x3 (July 12, 1973)

The upper and lower wings of the trawl are arranged so that they respond the same as the mouth sections on which they are mounted and thus help increase the opening of the mouth of the net. This operation is achieved by the use of an assemblyof strips of net, the mesh decreasing as the net narrows. FTP

2.1121 SCIENTISTS MONITOR SOUNDS OF VESSELS AND GEAR

Anonymous
Fishing News International 12, No. 5, 47-48 (May 1973)

Research workers are engaged in a program of investigating noises produced by fishing vessels and their gear. The effects these sounds have on fish behavior is included in the studies. This work is being performed by members of the staff of the Marine Fishing Laboratory of the Department of Agriculture and Fisheries, Aberdeen, Scotland. As a part of the program, experiments were performed to compare the noises produced by two trawlers under free running and trawling conditions. Trawler A was owned by a company which felt that the noises made by its trawlers were responsible for a lower catch rate than ships belonging to a rival company owning trawler B. The trawlers were similar in size and design. The major difference was in their propulsion systems. Trawler A had a direct drive between engine and propeller, and it was powered by a five-cylinder, two-stroke engine developing 950 bhp at 260 r/min. The propeller was four-bladed, 7 ft 7 in by 5 ft 4 in, and fixed pitch; it rotated at 205 r/min when towing. Trawler B had a reduction gearbox between the engine and propeller, and it was powered by a seven-cylinder, four-stroke engine developing 705 bhp at 430 r/min. The propeller was 9 ft by 8.29 ft, and it rotated at 143 r/min when towing.

The acoustic range consisted of five hydrophones laid on the seabed. The research vessel Clupea (anchored adjacent to the range) had instruments that were connected to the hydrophones. The trawlers, one at a time, steamed a course over the range. The sounds they made were recorded by the equipment on the Clupea. Sounds produced while free running and while towing gear were recorded. To the

2.113 PORASTANIE STATKOW RYBACKICH W WARUNKACH ŁOWISK AFRYKANSKICH [MARINE FOULING OF FISHING VESSELS ON THE AFRICAN FISHING GROUNDS]

Seidler, Wiesław (Zespół Wiedzy Rybackiej)
Zeszyty Naukowe No. 1, 117-130 (Feb. 1973) (Wyższa Szkoła Morska w Szczecin, Poland) [In Polish; English summary]

Divers using SCUBA techniques examined the marine fouling of Polish fishing vessels operating off the African coast. The study was conducted during the course of five fishing cruises during 1969 to 1972, including a stay of 73 days at Las Palmas. Fouling occurred during the whole year with the most extensive growth appearing in the summer months. The primary organisms involved were Cirripedia, Thoracica, and algae.
[2 figures, 2 illustrations, 2 tables, 5 references] FTP

2.1121

unaided ear, both ships radiated noises characteristic of diesel engines and propellers. A secondary modulation of propeller noise was detected which indicated that one propeller blade was noisier than the others for both vessels. Trawler A produced cavitation noise that predominated over engine noise in free running and towing--due possibly to higher revolutions per minute than trawler B. With trawler B, engine noise was more audible and a whining noise, originating in the gearbox, could be heard in free running. Towing the trawl required increasing engine r/min which caused cavitation noise that masked the whining noise. In subjective terms, trawler A appeared to be noisier than trawler B because the noise was pulsed--trawler B noise was smoother. Trawler A was noisier at frequencies between 70 and 200 Hz. This range partly coincides with the frequencies at which cod and haddock are known to be most sensitive, but the steadiness of sounds produced has more effect on fish behavior than differences in amplitude. SW

2.114 REFRIGERATION SYSTEMS ON SMALLER FISHING VESSELS

Ronning, John P. (Clover Park Vocational Technical Institute, Tacoma, Wash.)
Clover Park Vocational Technical Institute Publication, Tacoma, Wash. (n.d.), 17 pp.

The author prepared this publication to help North Pacific commercial fishermen achieve a better understanding of the suitability and use of refrigeration equipment to hold and to freeze their catch aboard the fishing vessel. This publication contains some general information and useful guidelines. Thus, the fisherman can be better prepared to make use of other available technical information and to discuss his needs for refrigeration equipment with other fishermen and with equipment suppliers. This bulletin covers the following topics: Refrigeration equipment considerations; Type of fishing operation and product; Matching vessel equipment and operating area; Operations and maintenance of equipment; Fishing vessel refrigeration systems (pipe coils for holding and freezing, cold plates for holding and freezing, air blast for holding and freezing, sea water/brine immersion chillers for holding and freezing, and brine spray for freezing); and Sources of information.
[2 figures, 1 table, 6 references] FTP

2.112 FAO CATALOGUE OF FISHING GEAR DESIGNS
(9.6)

Anonymous
FAO/Fishing News (Books) Ltd. (Unipub, Box 433, New York, NY 10016) (1973), 155 pp. Price $13.00. (In English, French, and Spanish)

This book contains designs and specifications for trawls, Danish seines, lampara, purse seines, lift nets, the stow net, gill nets and tangle nets, pots, dredges, and lines. Also listed are synthetic fibers, common netting yarns, and ropes. Cutting rates and taper ratios are given, with equivalents and conversions. SW

2.1125 PURSE SEINE

Karetnikov, A. M. Azov-Black Sea Basin Constr. Techn. Bur. (pat.)
U.S.S.R. Patent 354,823
Soviet Inventions Illustrated, Section III. Mechanical & General, May Week IV, p. x3 (July 12, 1973)

To facilitate the entry of deep-sea fish into the sack net, two plates of trapezoidal form and with the side edges interconnected are fitted to the seine. FTP

2.111 POLY(VINYL CHLORIDE) COMPOSITIONS WITH HIGH DENSITY

Hosaka, Shoichi, Jun Izeki, and Nakajiro Yoshida (Shin-Etsu Chemical Industry Co., Ltd.) (pat.)
Japan. Kokai 73 08332
Chemical Abstracts 78, No. 24, 148642s (June 18, 1973)

2.1129 HARPOON HEAD FOR UNDERWATER HUNTING GUNS

Lagutin, O. V., and A. L. Lugovenko (pat.)
U.S.S.R. Patent 351,510
Soviet Inventions Illustrated, Section III. Mechanical & General, May Week II, p. x5 (July 5, 1973)

The harpoon head is equipped with a stopper catch which improves the usefulness of the hunting gun. FTP

2.114 HYDRAULIC FISHING MACHINERY SYSTEMS FOR OUTBOARD MOTOR-POWERED BOATS

Fisher, R. Barry, and Charles A. Marshall (Oregon State University)
Station Bulletin 608, Agricultural Experiment Station, Oregon State University, Corvallis, Oreg. (Nov. 1971), 40 pp.

Outboard motor-driven vessels are used in gill net salmon fishing in Alaska, Pacific Northwest trolling, bay scallop dredging in New England, inshore hook and line fishing, and pot fishing in southeastern United States. Outboard motors offer the advantage of speed, low initial cost, and ease of maintenance and service. Nevertheless, use of outboard motor propulsion has been limited in certain fisheries because of the inability to secure a power takeoff system from the outboard motor. Such systems could be used to propel troll salmon gurdies, line haulers for longline trawl and pot fishing, line pullers for surface trolling, and gill net lifters and reels. Use of adequate mechanical power would help improve fishing capability and, eventually, increase productivity. The purpose of the present study was to design a reliable, inexpensive, and effective power takeoff system from the outboard motor flywheel. Five dories (20-22 feet) with outboard motors equipped with hydraulic power takeoff and gurdies were rigged and fished as trollers for salmon. Five different motors were used with horsepower ranging from 40 to 70. Four of the motors used a direct drive in-line flexible coupling mounted axially between the flywheel and pump shaft; one engine hydraulic power takeoff consisted of a belt and pulley system. The five dories logged a total

2.116 THE DETECTION OF FISH

Cushing D. H. (Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, England)
Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523 (June 1973), 220 pp. Price $16.50, £5.50.
Deep-Sea Research 20, No. 5, 1 (May 1973)

This book contains a description of the basic acoustic techniques for locating fish and for distinguishing different species of fish and other undersea objects. Estimating the abundance of fish from the echo traces is discussed, and the use of frequency modulation, side scan, and sector scanning sonar systems is considered. FTP

2.117 'GO-ANYWHERE' FACTORY-FREEZER JOINS HULL FLEET
(2.114)(2.118)

Anonymous
World Fishing 22, No. 5, 14-16 (May 1973)

The first of a pair of stern trawlers to be used in the British deep-sea fleet has been delivered to her owners at Hull, England. The new ship, the Dane, is 74.10 m (243 ft) long and is powered by a 3,246-bhp engine that delivers 2,300 shaft hp at 525 r/pm to a nozzled, variable pitch propeller. The engine also delivers, through a gearbox, power for an alternator and a generator, hydraulic pumps, and other auxiliaries. A shaft torque meter may be used to match propeller pitch to engine output. For safety and crew comfort, bilge keels and roll reduction tanks have been installed. The engine exhaust passes through the bipod mast to reduce ice collection on the superstructure. Six tons of fresh water may be produced per day, and another boiler provides steam for heating and deicing. Fire-resistant materials are used in the living quarters, and fire protection is provided by sprinkler and CO_2 systems. There are three control positions on the raised bridge including one in the wheelhouse; in addition, the deck is in clear view from the rear of the wheelhouse. The hull of the Dane has been strengthened for resisting ice, and living spaces have a ventilation system that can be air conditioned for hot climates. Frozen fillets can be produced in horizontal plate freezers or whole fish blocks in vertical plate freezers. The refrigerated fishroom has 531 m^3 (18,770 cu ft) of space. The fishmeal plant has a capacity of 30 tons per day, and the vessel has a fishmeal storage space of 319 m^3 (11,264 cu ft).

2.1476 DIRECT ESTIMATES OF GILLNET SELECTIVITY TO WALLEYE (STIZOSTEDION VITREUM VITREUM)

Hamley, John M., and Henry A. Regier (Dept. of Zoology, University of Toronto, Toronto 5, Ontario, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 6, 817-830 (June 1973)

Selectivity of gill nets is ordinarily determined "indirectly" by comparing catches with two or more mesh sizes, assuming that the selectivity curves for all the meshes have the same shape and amplitude. In the present study, the authors estimated the selectivity of gill nets by recapturing marked walleye using a mesh of 1½-4½ inches. The selectivity curves obtained were bimodal; but, each could be resolved into two unimodal components representing fish caught by wedging and by tangling. The authors fitted the selectivity of each mesh to a pair of Pearson's Type I curves; as mesh size increased, amplitude of the selectivity curves increased rapidly and tangling occurred over a progressively narrower range of (fish girth)/(mesh perimeter) ratio. Because the assumption of equal amplitudes in the indirect methods is not realistic, the indirect methods overestimate selectivity curves on the left and underestimate them on the right.
[10 figures, 4 tables, 35 references] FTP

2.116 (9.6)

MANUAL OF METHODS FOR FISHERIES RESOURCE SURVEY AND APPRAISAL. PART 2. THE USE OF ACOUSTIC INSTRUMENTS FOR FISH DETECTION AND ABUNDANCE ESTIMATION

Forbes, S. T. (Marine Laboratory, Aberdeen, Scotland), and O. Nakken (Institute of Marine Research, Bergen, Norway)
FAO Manuals in Fisheries Science No. 5, Food and Agriculture Organization of the United Nations, Rome, Italy (1972), 138 pp. Price not given.

A preliminary edition of the manual was issued in 1969 as FAO Fisheries Technical Paper No. 83. This present manual has been updated to include the most recent developments and techniques in the use of instruments for fish detection. Sixteen authors from four countries have contributed to the manual. The five main sections of the manual are entitled as follows: "Physical Properties of Sound in Water: Its Propagation and Reflection from Targets"; "The Structure and Functioning of Sonar Equipment"; "The Identification of Targets and Characteristics of Echo Records"; "Abundance Estimation"; and "New Developments in Sonar Techniques." Each section is well illustrated with diagrams and photographs, and there are 87 references. SW

2.117 (2.114) (2.116)

3 GLASS 65-FOOTERS LAUNCHED

Anonymous
Western Fisheries 86, No. 2, 52, 66, 70 (May 1973)

Three fishboat hulls were launched May 1973 in Victoria, British Columbia, Canada. They are made of fiberglass and are 65 feet long with an 18 foot beam. The first, the Pakalot, is a combination halibut longliner and packer. She has a 365-hp diesel engine for main power which drives a 54 × 46 propeller; her speed is calculated at about 11 knots. A 6-cylinder engine provides auxiliary power. The hydraulic powered steering is equipped with automatic pilot. Electronic equipment will include echo sounder, loran navigation capability, radiophone communication, and automatic direction finder.

The second hull is for the packer Tamanawas. A Detroit diesel engine, model V12-71, supplies main power, and a model 3-71 diesel engine is for auxiliary power. Hydraulic steering with automatic pilot are also installed. Navigation, communication, and fish finding apparatus include radar, echo sounder, loran radio, radiophone, and direction finder. The Tamanawas has four brine refrigerated holds with a 100-ton capacity. Her accommodations have space for a crew of six.

The third hull became the Waterfall for the halibut longline fishery. She has a 365-hp main power diesel engine with a 56 × 46 propeller; auxiliary power is supplied by a 6-cylinder diesel engine. Her steering is hydraulic powered with automatic pilot. Her electronic equipment includes a radar, two echo sounders, two loran radios, an automatic direction finder, a VHF/FM radiophone and an SSB radiophone. The refrigeration is of the forced air type.
[2 photographs] SW

2.114

of 3,045 hours fishing time. The authors conclude from the engineering and operational data obtained that reliable, efficient, and relatively inexpensive hydraulic power takeoff is attainable from outboard motors to power fishing machinery. The system uses and designs are described in this bulletin.

In addition, the authors designed and successfully tested lightweight durable gurdies; these gurdies will be offered to fishermen through a commercial source.
[57 figures, 17 diagrammatic plans, 6 references, 4 appendixes] FTP

2.117 (2.114)(2.118)

The Dane is equipped to use the largest pelagic trawl available. The trawl winch has a 600-hp motor with a 200-hp booster motor from the hydraulic system which also powers the net drum. The winch has two main and four auxiliary barrels and holds 2,740 m (1,500 fathoms) of 89-mm (3.5 in) circumference warp. Views of the ships decks are shown, and a list of the main suppliers of the ship's equipment is included.
[6 photographs, 1 figure] SW

Nedvigo, N. M., M. I. Polyanov, V. N. Churunov (Siberian Br. Fishing Fleet Des. Inst.) (pat.)
U.S.S.R. Patent 354,825
Soviet Inventions Illustrated, Section III. Mechanical & General, May Week IV, p. x3 (July 12, 1973)

This fishing gear hoist consists of a driven drum on a stand; it is capable of greater pulling effort because the angle at which the cable is held by the drum is increased. To prevent the running lines of the gear from becoming twisted, a guide is fixed to the stand; the guide is in the form of a spiral coaxial to and running around the outside of the drum. FTP

Malkyavichus, S. K. (Klaipeda Branch Fishing Fleet Design Inst.) (pat.)
U.S.S.R. Patent 351,509
Soviet Inventions Illustrated, Section III. Mechanical & General, May Week II, p. x5 (July 5, 1973)

A system of electrodes permits a reduction in the consumption of energy for the development of the electrical field. FTP

2.3 DUNGENESS CRAB MEAT EXTRACTION

Engesser, William F., Viravat Cholvanich, G. Paul Willis, and Terry W. Johnson
Industrial Engineering Station, Oregon State University, Corvallis, OR 97331 (n.d.), 14 pp.

This paper describes a step-by-step method for extracting the meat of Dungeness crab by hand. There are 60 illustrations depicting each step in the crabmeat picking process. This manual, with its illustrations, can be used effectively. A 16-mm sound, color motion-picture film is also available; it describes in considerable detail each movement involved in the picking of crab meat. The motion-picture film may be purchased for about $200 or may be rented for about $8.00 per week from the Audio-Visual Dept., Oregon State University.
[61 illustrations] FTP

2.3 TEXTURED FOOD AND ALLIED PRODUCTS
(9.6)

Gutcho, M. (editor)
Noyes Data Corp., Park Ridge, NJ 07656 (1973), 315 pp. Price $36.00.
W. J. Wolf (USDA/ARS, Northern Regional Research Laboratory) (reviewer)
Food Technology 27, No. 8, 79-80 (Aug. 1973)

This book contains a summary of the U.S. patent literature on textured foods since 1954. Eighty-two patents are covered (only 15 were issued before 1960) with emphasis on meatlike products. About one-third of the book deals with a step-by-step description of the spun protein fiber process. Another section deals with simulation of meats by alternate techniques (chewy protein gels, expansion, extrusion, and rapid heating of protein slurries under pressure). Still another section considers textured foods such as nutmeats, snack foods, cereals, high-protein spreads, and cheeselike products. FTP

2.3 USE OF OZONE IN SEA WATER FOR CLEANSING SHELLFISH
(1.8)

Anonymous
Effl. Wat. Treat. J. 12, 260-262 (1972)
Water Pollution Abstracts 45, No. 9, 349, Abstract No. 2108 (Sept. 1972)

The system for cleansing shellfish with preozonized sea water was used at a station on the Mediterranean coast at Sète, France. Results of investigations on the elimination of Escherichia coli from the flesh and intravalvular water of the shellfish, and on the amount of ozone required, indicate that the system would be satisfactory on an industrial scale. In addition, the use of ozone has certain advantages over use of chlorine; it has a rapid cleansing action in cases of heavy pollution, and it has no destructive effects on marine plankton. SW

2.3 FOOD EXTRUSION

Rossen, Jack L., and Robert C. Miller (Nabisco, Inc., Research Center, Fair Lawn, NJ 07410)
Food Technology 27, No. 8, 46, 48-53 (Aug. 1973)

In the food extrusion process, food material is forced to flow under one or more of a variety of conditions of mixing, heating, and shear, through a die to produce a formed and/or puff-dried product. In this article, the authors describe the types of and applications of extruders used in the food industry; present an idealized model of a single-screw extruder as an aid to analysis of extruder operations; and answer some frequently asked questions about food extruder operations.
[5 figures, 2 tables, 3 references] FTP

2.3 (1.81) [PURIFICATION OF MOLLUSCS BY ULTRAVIOLET RADIATION -- PURIFICATION STATION OF OLHÃO] DEPURÃCAO DE MOLUSCOS POR RADIAÇÕES UV -- POSTO DE DEPURACAO DE OLHÃO

Ferreira, P. S. (Inst. Biol. Marít., Cais do Sodre, Lisboa, 2, Portugal)
Bol. Inf. Inst. Biol. Marít. Lisb., 4, 8 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 3, Abstract No. 3Q3035M, 212 (Mar. 1973)

Oysters contaminated with Escherichia coli were purified in tanks with a flushing stream of water. To reduce the required time to purify the oysters, the flush water was exposed to UV radiation at about 2537 Å. Tests for E. coli in the oysters and in the effluent water indicated that 36 hr. of flushing was sufficient to provide safe bacterial levels. SW

2.9 TOXICITY OF THE MEAT OF COMMON FISH TO WHITE MICE (MUS MUSCULUS VAR. ALBA)

Brison, J. (Lab. Microbiol. Biol. Mar., Fac. Med. Pharm., Poitiers, France)
Chemical Abstracts 78, No. 7, 41732u (Feb. 19, 1973)

2.43 (3.238)(3.38) DESIGN FOR DISPOSAL IN FOOD PACKAGING

Sacharow, Stanley (Reyonolds Metals Co., New York)
Food Engineering 45, No. 6, 82-84 (June 1973)

The reuse or disposal of packaging materials is one of the questions bothering consumers and packaging technologists. The author suggests that disposal criteria must be integrated into the development of new food packaging. A correct packaging concept may include: avoidance of certain materials, elimination of more packing than is necessary, reusable packages, and bulk refill packaging. The disposability of packaging material should be investigated relative to the following characteristics: crushability, waste value, weight, volume, combustibility, and ease of separation from other materials. Numerical, relative values can be assigned to each factor, and, by determining the total value, a rough estimate of the disposability of the packaging material can be made. Increased sales of a product may be realized if the public is informed that the packaging may be disposed of in an ecologically sound manner. Plastics are stable and resist disintegration, but when they are properly disposed of, as in landfill, they are useful. Combustion of plastics in modern equipment may be a new method for generating heat without air pollution. Plastics that can be degraded by bacteria, light, or through water solubility are being investigated. Aluminum and glass containers are currently being salvaged for remelting and manufacture into new products. The author concludes that salvage and reuse of waste materials can be profitable by use of new designs and new goals in management.
[1 photograph, 1 table] SW

2.3 FISH AUTOLYSIS

LaMotte, G. (pat.)
British Patent 1,309,596
Food Technology 27, No. 8, 82 (Aug. 1973)

Mixtures containing ground fish entrails and fish or crustacea (pH of about 4) are autolyzed under an inert gas until they reach a pH of 6.5; the liquid product is then removed. FTP

2.3 FISH AND SHELLFISH PROCESSING

Fehmerling, G. B.; Ocean Research Corp. (pat.)
U.S. Patent 3,729,324
Food Technology 27, No. 8, 82 (Aug. 1973)

The fish or shellfish (hard shell removed) is immersed in a solution containing a proteolytic enzyme, a glycosidase hydrolase, and a lipolytic enzyme to separate the undesirable tissue. FTP

2.3 FISH PROCESSING

Wiggins, G. K.; Marine Construction and Design Co. (pat.)
Canadian Patent 924,856
Food Technology 27, No. 8, 82 (Aug. 1973)

Compressive force is applied to fish to remove milt, roe, and other entrails. FTP

2.3 SHAPED FROZEN FISH

Langlands, I. H.; National Sea Products Ltd. (pat.)
U.S. Patent 3,728,136
Food Technology 27, No. 8, 82 (Aug. 1973)

This die-forming apparatus is used for forming individual portions of fish from partially frozen pieces. FTP

2.6 (9.2) PROCEDURE FOR PRODUCT APPROVAL AND PURCHASE: ARMY AND AIR FORCE EXCHANGE SERVICE

Boies, Henry I., and Richard C. Raulerson (Market Research and Services Division, National Marine Fisheries Service, Southeast Region, St. Petersburg, FL 33701)
Marine Fisheries Review 35, No. 7, 15-17 (July 1973)

The Army and Air Force Exchange Service (AAFES) procures food products for use by military installations worldwide, including post exchange (PX) and base exchange (BX) food outlets, but excluding troop feeding, clubs, and commissaries. In 1972 it handled food products valued over $176 million, including seafood valued over $1.4 million.

Examples of frozen seafood products currently approved for purchase include: catfish (whole and fillets), clam fingers, cod (fillets, sticks, and cakes), crab cakes, batter-dipped fish (unspecified), flounder portions, haddock portions, halibut (steaks and fillets), scallops, shrimp (breaded, P & D, and tempura), breaded oysters, perch fillets, seabass fillets, seacake (unspecified) and comminuted croaker portions.

Although AAFES represents a fairly large outlet for a diverse number of seafood products at present, it is felt that this market outlet has not been fully developed either in terms of volume or number of products. And a major reason for this is that most potential suppliers lack adequate knowledge of this market. Actually, AAFES is quite flexible in its manner of procurement of supplies and will accept samples and product information from any manufacturer (prime source) or regular dealer. AAFES is desirous of providing onbase military personnel with fine quality products at the best price possible. During each year it observes

3.5 (2.00) BACTERIAL COUNTS AND RANCIDITY ESTIMATES OF STORED QUICK-SALTED FISH CAKES

Del Valle, F. R., J. Hinojosa, D. Barrera, and R. A. De La Mora (School of Marine Sciences & Food Technology, Instituto Tecnológico de Monterrey, Guaymas, Mexico)
Journal of Food Science 38, No. 4, 580-582 (May-June 1973)

Previously published reports have described the production of quick-salted fish cakes. The products are quite stable without refrigeration because of their high salt content (about 50%) and low moisture level (about 10%). The present study was carried out to obtain a quantitative measure of the stability of the dried fish cakes. Sun-dried and tunnel dried quick-salted fish cakes (final moisture content about 6-8%) were held without packaging at ambient temperature (35°-40° C) for 3 months. Total plate, halophilic, and staphylococcal bacterial counts were determined on the cakes after 0, 1, 2, and 3 months of storage. Thiobarbituric acid (TBA) levels were also determined at each storage test period on the samples before and after desalting. Desalting was carried out by holding the dried quick-salted fish cakes in boiling water for 5 min. The species of fish used for preparing the cakes were skipjack tuna, mullet, Spanish mackerel, and shark from the Gulf of California.

Microbial contamination of the quick-salted fish cakes did not seem to be high and counts decreased with storage. Bacterial counts depended upon the salt and moisture contents of the cakes. Staphylococci were not found to be present. The different quick-salted fish cakes tend to become rancid to different degrees depending upon the oil content, degree of unsaturation of the oil, drying time for

3.63 (2.3) MOLLUSK PROCESSING

Gray, R. D.; Gray Chemical Inc. (pat.)
Canadian Patent 923,366
Food Technology 27, No. 8, 82 (Aug. 1973)

The cooked flesh of mollusks are wet milled to produce a homogeneous slurry and then the slurry is dried. FTP

3.9 (0.5) PREPARING PICKLED FISH BY FERMENTING A FISH AUTOLYZATE

Gattino, Jean, Albert Hurm, and Georges Lamotte (pat.)
French Patent 2,097,637 (Apr. 7, 1972)
Chemical Abstracts 78, No. 1, 3008e (Jan. 8, 1973)

3.9 (0.5) BROWN DISCOLORATION IN FISH JELLY PRODUCTS. III. VARIOUS CONDITION AFFECTING THE DISCOLORATION BY TWO SPECIES OF BACTERIA

Fujita, Yatsuka, and Tatsuo Kanayama (Food Addit. Sect. Res. Lab., Ueno Fine Chem. Ind., Ltd., Itami, Japan)
Chemical Abstracts 78, No. 23, 146438f (June 11, 1973)

3.5 (2.00)

the cakes, presence or absence of hematin pigments, and presence or absence of sunlight when drying the cakes. Some of the rancid components of the quick-salted fish cakes could be removed by the process of desalting in boiling water. Order of preference of the fish cakes by taste panel evaluation varied indirectly with the degree of rancidity of the cakes.
[3 figures, 3 tables, 5 references] FTP

4.11 NEW METHODS
(9.6)

Newman, H. A. I., and Peter E. Braun (compilers)
Journal of Lipid Research 14, No. 3, 373-375 (May 1973)

This is a listing of pertinent references to analytical lipid methods published recently. It lists 78 references. FTP

4.11 DETERMINATION OF POLYUNSATURATED LIPID ACIDS OF MARINE ORGANISMS

Rzhavskaya, F. M., and T. A. Dubrovskaya (Vses. Nauchno-Issled. Inst. Rybn. Khoz. Okeanogr., Moscow, U.S.S.R.)
Chemical Abstracts 79, No. 3, 16984r (July 23, 1973)

3.235 SHAPED FROZEN FISH PRODUCT

Dickie, D. E.; National Sea Products Ltd. (pat.)
Canadian Patent 923,367
Food Technology 27, No. 8, 82 (Aug. 1973)

Formed, shaped products are prepared from portions of frozen fish flesh. The individual portions of frozen fish are forced into a forming die cavity. FTP

2.6 (9.2)

and samples hundreds of different food items in order to keep current with the ever changing trends in food.

The general procedure in selling to AAFES is to arrange first for an appointment with one of the procurement specialists at AAFES headquarters or at one of five exchange regions, preferably one located nearest to the point of distribution. The procurement specialist contacted generally calls in one or more food specialists to determine whether or not there is any interest in the product. Samples should be made available with as much written information as possible. Any additional oral information during the meeting with the group or individual is always helpful. Some selling points of the product by the vendor add strength to the transaction. If the procurement specialist feels there is a possibility of using the product, it is then tested and sampled in AAFES facilities by food specialists and it is then determined if it will be accepted or rejected.

This procedure takes a minimum of ten days to two weeks. The individual or firm that presented the product is notified, usually by telephone, as to the result, although it is permissible for the vendor to contact AAFES at an earlier date if he wishes.

If the product is found acceptable, temporary procurement authority is given and it will be included in the AAFES Food and Expense Supplies Purchase Descriptions, ESM 65-3. This manual is revised and distributed to the various procurement officers, as needed. Even though the product has been accepted and placed in the manual, this does not mean that the procurement officer will buy and use the product.

Before actual purchase, all products must meet specifications. Although not necessary, it is helpful if the plant where the product is processed operates under some type of inspection service.
[1 figure] Reprinted in part

3.5 NEW PHYSICAL METHODS IN THE MECHANIZATION OF FISH PROCESSING
(2.3)(3.23)
(3.33)

Terent'ev, A. V.
Proceedings of the All-Union Research Institute of Marine Fisheries and Oceanography 79, 179-184 (1971). Translated from Russian, 1972. Published for the National Marine Fisheries Service and the National Science Foundation. Order No. TT71-50131, available from U.S. Dept. of Commerce, National Technical Information Service, Springfield, VA 22151. Price not given.

The traditional fish processing methods involved such principles as osmosis, diffusion, and absorption (salting and smoking), heating and cooling (frying, boiling, sterilization, and freezing), and cutting with a blade (dressing). Fish processing plants will require new methods to increase the yield and reduce costs. An example of the application of new physical methods is the vibro-barreling technique. In the past, medium and large salt fish (herring, cod) were packed in regular rows in barrels and boxes. Attempts at mechanizing this type of packing ended in failure. In 1950 a method was proposed in which the herring were dropped into a vibrating barrel. The herring were packed regularly and densely in this method; the container capacity was increased 4%-6% and manual filling with subsequent mechanical pressing of the pack was eliminated. Improvements to the method involved longitudinal, mixed horizontal-vertical and circular vibrations in a horizontal plane. The introduction of these improvements increased productivity of the labor force in the packing of salt fish by 350%-400%. Other principles involved in better methods for fish processing are ultrasound, hydraulics, hydrodynamics, pneumatics, aerodynamics, photoelectronics, and gamma irradiation. SW

4.13
(0.31)(8.42) PRESENCE OF LIPID-SOLUBLE SELENIUM COMPOUNDS IN MARINE OILS

Lunde, Gulbrand (Cent. Inst. Ind. Res., Oslo, Norway)
Chemical Abstracts 78, No. 23, 145425n (June 11, 1973)

6.31
(4.1) TRIGLYCERIDE FATTY ACIDS OF SELECTED HIGHER MARINE FUNGI

Block, J. H., P. Catalfomo, and G. H. Constantine, Jr. (School of Pharmacy, Oregon State University, Corvallis, OR 97331)
Mycologia 65, No. 2, 488-491 (Mar.-Apr. 1973)

Higher marine fungi may be important sources of vitamins and other metabolites in marine detritus food webs. To investigate this possibility, experiments were performed to determine the potential of the organisms in supplying triglyceride fatty acids.

Shake cultures of Corollospora maritima Werdermann (Ascomycetes) isolate R-19, and Zalerion maritimum (Linder) Anastasiou (Fungi Imperfecti) isolate R-6 were grown, harvested, washed, dried, and ground to a powder. The powders were extracted to exhaustion with petroleum ether in a Soxhlet apparatus. Column chromatography was used to separate fatty acids from other materials. Gas chromatography (GC) techniques were used to analyze the components of the fatty acid fraction. Extracts of isolates R-19 and R-6 were found to be identical by thin-layer chromatography and infrared spectrophotometry. On a dry-weight basis isolate R-19 yielded 5.1% triglycerides and R-6 yielded 0.06%. Hydrolysis and GC analyses of the triglycerides showed a mixture of triglycerides containing several major fatty acids and smaller amounts of several others. The fatty acids yield included oleic, palmitic, stearic, and linoleic; lesser amounts of caproic, myristic, palmitoleic, arachidonic, behenic, and linolenic were found. These results indicated that marine and terrestrial higher fungi have similar fatty acids, and they differ from those reported to be found in lower fungi. The oil found in marine Ascomycetes

4.2 OIL OF FISH MEAL. IV. PROPERTIES OF OIL OF WHITE FISH MEAL MANUFACTURED IN THE NORTH PACIFIC

Toyama, Kenzo, Hiroshi Arakawa, and Nobuichiro Okada (Lab. Fish. Ind. Chem., Tokyo Univ. Fish., Tokyo, Japan)
Chemical Abstracts 77, No. 25, 163167p (Dec. 18, 1972)

6.32 CHEMICAL CHARACTERIZATION OF MUCILAGINOUS POLYSACCHARIDES FROM ULVACEAE SPECIES NATIVE TO THE PUGET SOUND

Medcalf, D. G., C. F. Root, C. L. Craney, D. Mukhopadhyay, C. K. Miller, and W. D. Hopewell (Dept. of Chemistry, University of Puget Sound, Tacoma, Wash.)
Proceedings of the Seventh International Seaweed Symposium, Sapporo, Japan, Aug. 8-12, 1971. University of Tokyo Press (n.d.) pp. 541-547.

As part of a general project to determine the potential for increased utilization of marine polymers, the researchers studied the water-soluble, sulfated polysaccharides from four species of green algae; Ulva lactuca, Enteromorpha compressa, E. intestinalis, and E. linza. This paper reports on the chemical composition and structure of these products.

Samples of weeds were collected off Tacoma, Seattle, Cape Alva, and Penrose Point, Wash., in June 1970. The dried weed was extracted with 85% ethanol. The decolorized product was extracted with water at 85°-90° C. The extracts were concentrated and then precipitated with ethanol. The precipitate was dissolved in warm water, dialyzed against distilled water, and freeze dried to produce a "crude polysaccharide." The crude product was treated with α-amylase (to remove starch) and the protein content was reduced by trichloroacetic acid treatment. The dialyzed samples were freeze dried and the resulting polymer products obtained were used in this study.

Polymers from the four species of green algae were composed of D-glucuronic acid, L-rhamnose, and D-xylose, and traces of galactose, glucose, and mannose. The rhamnose:xylose ratio varied from 2.8:1 to 6.2:1. The content of uronic acid ranged from 19% to 22%, and that of sulfate ranged from 12.7% to 19.8%. Apparently,

4.81 THE USE OF FISH OIL IN YELLOW MARGARINE

Wessels. J. P. H.
South African Shipping News and Shipping Industry Review 27, No. 12, 69-70 (Dec. 1972)

The inclusion of low-priced fish oil in margarine would allow it to be produced at a lower price. Another advantage is that beta carotene, the coloring material in yellow margarine, tends to break down less in the presence of fish oil than in contact with coconut oil. The author believes that fish oil could be included in yellow margarine without detriment to the fatty-acid composition of the end product. Fish oils contain high levels of unsaturated fatty acids and could contribute toward advertised claims made for polyunsaturated margarines. Fish oil is allowed to be used for margarine manufacture in Canada. The author, by implication, would like the Government of South Africa, which forbids fish oil in margarine, to change the regulations and approve its use.
[1 table, 2 references] SW

4.13 FATTY ACID COMPOSITION OF FISH OIL. III. FATTY ACID COMPOSITION OF OIL FROM DORSAL AND VENTRAL FLESH IN JACK MACKEREL

Ueda, Tadashi (Shimonoseki Coll. Fish., Shimonoseki, Japan)
Chemical Abstracts 78, No. 25, 156865g (June 25, 1973)

6.32

all four species produce similar, highly branched, sulfated, uronic acid-containing polysaccharides. The polymers from these Pacific Ocean plants are basically similar to those reported earlier for U. lactuca and E. compressa from Atlantic Ocean waters. The polymers differ in their relative rhamnose: xylose ratio. They also show some basic structural differences; the products from E. intenstinalis and E. compressa appear to be less highly branched and to be lower in molecular weight than the products from U. latuca and E. linza.
[5 tables, 18 references] FTP

6.34 FIXATION OF STRONTIUM, ZINC, AND CERIUM RADIONUCLIDES BY SODIUM ALGINATE AND ALGINIC ACID FROM SEA WATER

Lazarenko, G. E. (Inst. Biol. South Seas, Sevastopol, U.S.S.R.)
Chemical Abstracts 78, No. 23, 143980r (June 11, 1973)

6.31

contained neutral fats having a small amount of unsaturation. The yields of triglycerides and the ratio of their component fatty acids can be expected to vary with cultural conditions and the selection of isolates of the organisms. The reported ability of C. maritima to accumulate ergosterol, choline, and mannitol, and a high yield of fatty acids, suggests that this fungus and related species could become an important source of energy and vitamins--or their precursors--for filter-feeding tidelands animals. SW

6.15 SAFETY EVALUATION OF FISH PROTEIN CONCENTRATE (2.9) OVER FIVE GENERATIONS OF RATS

Newberne, Paul M., Otto Glaser, and Leo Friedman (Dep. Nutr. Food Sci., Massachusetts Inst. Technol., Cambridge, Mass.)
Chemical Abstracts 78, No. 9, 56608g (Mar. 5, 1973)

4.14 SULFONATED OILS (1.953)

Houghton Hispania S.A. (pat.)
Spanish Patent 371,629 (Mar. 1, 1972)
Chemical Abstracts 78, No. 8, 45386g (Feb. 26, 1973)

7. (9.3) CRITICAL EVALUATION OF THE AOAC METHOD OF ANALYSIS FOR NITRITE IN MEAT

Nicholas, Rosemary A., and Jay B. Fox, Jr. (Eastern Regional Research Center, Agricultural Research Service, Philadelphia, PA 19118)
Journal of the Association of Official Analytical Chemists 56, No. 4, 922-925 (July 1973)

The AOAC method (24.014-24.015) for analysis of nitrite in meat products was adopted in 1925 and has remained unchanged since then. In the method, 5 g comminuted meat sample is diluted to about 300 ml in a 500-ml volumetric flask and heated 2 h on a steam bath; 5 ml of saturated mercuric chloride is added, and the flask contents are cooled, diluted to volume, and filtered. An aliquot of the filtrate is added to 2 ml Griess reagent and diluted to 50 ml. (Griess reagent is a mixture of dilute sulfanilic acid and 1-naphthylamine separately dissolved in 15% acetic acid.) Color is allowed to develop for 1 h, then the absorption is measured in a spectrophotometer at 520 nm. The amount of nitrite present is found by comparing the absorption of the sample with that of a standard nitrite curve. The authors critically examined each step of the official method, measured the effects of altering some steps in the procedure, and compared newly proposed methods for reliability with the official method.

Mercuric chloride is used as a precipitant of protein; it also cleaves nitrosothiols which, other reports suggest, is important in nitrite analysis. The authors recommend that addition of mercuric chloride be discontinued because prolonged cooking accomplishes the same purposes and also because the compound is

7.0 (9.19) THE USE AND EFFECT OF MIXED STANDARDS ON THE QUANTITATION OF POLYCHLORINATED BIPHENYLS

Beezhold, F. Lee, and Virginia F. Stout (National Marine Fisheries Service, Pacific Fishery Products Technology Center, Seattle, Wash.)
Bulletin of Environmental Contamination and Toxicology 10, No. 1, 10-15 (July 1973)

Although they have been frequently reported as ubuiquitous pollutants, the quantitation of PCBs in analytical procedures remains imprecise. Other reports indicated that quantitation of PCBs have been accomplished by either measuring the heights of prominent peaks in gas-liquid chromatograms (GLC) or by measuring the total area of all sample PCB peaks and relating these to the area of GLC peaks yielded by standard PCB mixtures. The authors believe that these procedures do not provide accurate quantitation because of a lack of primary standards of individual PCB components. In addition, the authors found that the GLC peaks were not constant for the various isomers existing in a PCB mixture. The values varied relative to which Aroclor (a PCB) or mixture of Aroclors were used as a standard. Experiments were performed to illustrate the problems in comparing samples containing mixtures of PCBs to a specific Aroclor.

Samples of fish materials were prepared for GLC by solvent extraction and cleanup by elution. Separate standards of Aroclor 1254 and 1260 were prepared; and mixtures of these PCBs were prepared in increments of about 10% Aroclor 1260 in Aroclor 1254. Quantitation of the sample extracts and PCB standards was accomplished by excising the chromatograms and weighing them on an analytical balance. Using this procedure, a curve was prepared which relates the composition of

7.1 CARBON-13 THE GROWING ORGANIC ISOTOPE

Eck, C. F. (Monsanto Research Corp., Mound Laboratory, Miamisburg, Ohio)
Research/Development 24, No. 8, 32-38 (Aug. 1973)

Carbon is abundant in nature, in organic and in inorganic substances. Naturally occurring carbon is 98.9% carbon-12 and 1.1% carbon-13. These isotopes are stable and nonradioactive. Up to now carbon-13 enriched to 60% and 90% has been available only at relatively high prices. Recently, however, carbon-13 enriched to 90% became available in relatively large quantities at much lower prices. The availability of low cost carbon-13 and improved instrumentation for detection of carbon-13 in a variety of molecules and concentrations have created considerable interest in its use in studies of organic molecules, enzymes, proteins, and possibly diagnostic and tracer applications. This article contains a brief history of carbon-13, an overview of its separation, production, prices, distribution, usage problems, and some current uses. The current and potential uses for carbon-13 include studies of animal and human metabolism, clinical diagnostic studies, ecology tracers, drug studies and testing, kinetic studies, molecular structure of macromolecules and organic molecules, and organic reaction mechanisms. [5 figures, 2 tables, 83 references] FTP

7.5 (9.19) LIQUID CHROMATOGRAPHY OF CARBAMATE PESTICIDES

Thruston, Alfred D., Jr. (Southeast Environmental Research Laboratory, College Station Rd., Athens, GA 30601)
Environmental Protection Technology Series No. EPA-R2-72-079 (Oct. 1972), vii + 15 pp. National Environmental Research Center, U.S. Environmental Protection Agency, Corvallis, OR 97330. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price 55 cents.

Most carbamate pesticides cannot be analyzed directly by gas chromatography because they are thermally unstable; the carbamate must first be converted to a suitable derivative. Liquid chromatography (LC) is a technique that provides selectivity and moderate sensitivity for analysis of the heat-labile carbamates.

A commercial liquid chromatograph was evaluated under either of two conditions and columns: (1) a 1 m. × 2 mm. i.d. stainless-steel column packed with Permaphase octadecyl silane (for nonpolar compounds). Mobile phases were 6% and 30% methanol in water. A pressure of 1,000 p.s.i. at 50° C. maintained a flow of 1 ml. per minute; or (2) a 1 m. × 2 mm. i.d. stainless-steel column packed with Permaphase ether (for more polar type carbamates). Mobile phases were hexane, 1% isopropanol/hexane, and 4% isopropanol/hexane. A pressure of 400 p.s.i. at 40° C. maintained a flow of 1 ml. per minute. The retention times and sensitivities for 17 carbamates were determined on Permaphase octadecyl silane; in addition, the chromatograms of seven carbamates were determined on the Permaphase ether column. Most of the carbamates eluted as sharp symmetrical peaks in 10 min.

7.0 (9.19)

the standard to the g paper/ng PCBs. The results of the experiments indicated that the choice of a standard could alter the values yielded by GLC by more than a factor of 2. The authors suggest that the mixture of PCBs used in GLC determinations should be reported along with resulting values.

Chromatograms are given for examples of samples containing mixtures of PCBs that are not comparable to a specific Aroclor.

[2 figures, 1 table, 12 references] SW

7.0 EXTRACTION AND GAS CHROMATOGRAPHIC DETERMINATION OF METHYL-, ETHYL-, AND METHOXYETHYLMERCURY(II) HALIDES

Ealy, James A., Wilbur D. Shults, and John A. Dean (Anal. Chem. Div., Oak Ridge Natl. Lab., Oak Ridge, Tenn.)
Chemical Abstracts 79, No. 5, 28000e (Aug. 6, 1973)

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7. (9.3)

corrosive, toxic, and a pollutant. In the preparation of Griess reagent, commercial grade 1-naththylamine is used directly. The authors recommend that, because of impurities present, the compound be recrystallized from boiling water and the purified material used instead. In the color-developing step, the authors recommend that the dilution of Griess reagent be decreased from 1:25 to 1:10 and the reaction time be reduced from 1 h to 25 min. The increased concentration of Griess reagent will provide for completion of the color development reaction in a shorter time.

In studies to determine the effects of altering the official procedures, a number of compounds were added to the Griess reagent to see if they would benefit the reaction. The results indicated that the compounds had no effect or were less effective than the unmodified reagent.

The official procedure for sample preparation was compared to procedures in the following reports; however, the authors found nothing to recommend any of them over the AOAC method: L. Kamm, G. G. McKeown, and D. M. Smith [JAOAC 48, 892 (1965)], A Mirna [Proceedings of the 16th European Meeting of Meat Research Workers 1, 681 (1970)], and A. Adriaanse, and J. E. Robbers [J. Sci. Food Agr. 20, 321 (1969)].

[3 figures, 2 tables, 11 references] SW

7.5 (9.19)

The author concluded that LC shows promise for analysis of carbamate residues because it provides separations with speed and high resolution comparable to those of gas chromatography. A list of chemical names and sources of carbamate pesticides is given; retention times, sensitivities, and chromatograms of the carbamates are also shown.

[3 figures, 3 tables, 6 references] SW

7.599 SEPARATION AND IDENTIFICATION OF CARBOFURAN, ITS METABOLITES, (9.19) AND CONJUGATES FOUND IN FISH EXPOSED TO RING CARBON-14-LABELED CARBOFURAN USING ITLC [INSTANT THIN-LAYER CHROMATOGRAPHY] SILICA GEL STRIPS

Bruce, W. N. (Illinois Nat. Hist. Surv., Urbana, Ill.)
Chemical Abstracts 78, No. 11, 70278f (Mar. 19, 1973)

7.42 ATOMIC ABSORPTION SPECTROSCOPIC DETERMINATION OF CADMIUM (9.19)

Nakamuro, Katsuhiko, Yasuyoshi Sayato, and Masaharu Tonomura (Eisei Shikensho, Tokyo, Japan)
Chemical Abstracts 78, No. 25, 157900b (June 25, 1973)

7.42 SIMPLE METHOD FOR THE ACTIVATION ANALYSIS OF MERCURY IN (1.12) FISH. MERCURY CONTENT IN VENEZUELAN CANNED TUNA

Lukowitz, J. A., F. Montoloy, and M. Heurtébise (Inst. Venez. Invest. Cient., Caracas, Venezuela)
Chemical Abstracts 79, No. 5, 30553f (Aug. 6, 1973)

7.8 SLIDE RULE FOR PREDICTING SHELF LIFE OF COD

Ronsivalli, L. J., and Robert J. Learson (National Marine Fisheries Service, NOAA, Atlantic Fishery Products Technology Center, Gloucester, Mass.), and S. E. Charm (New England Enzyme Center, Tufts University School of Medicine, Boston, Mass.)
Marine Fisheries Review 35, No. 7, 34-36 (July 1973)

The slide rule described in this article is based on a publication by S. E. Charm, R. J. Learson, L. J. Ronsivalli, and M. S. Schwartz [Food Technology 26, No. 7, 65-68 (1972)].

According to that publication, the spoilage of cod occurs at a constant rate for any given temperature in the range of 32° F to 46° F. When the spoilage rate constants were plotted versus the temperature, a linear relationship was suggested. Charm et al. also found that when cod fillets were stored under conditions of varying temperatures, the spoilage rate constants were unaffected when the sequence of storage temperature was varied.

These findings clearly indicated that a device for predicting the shelf life of cod fillets is possible. The slide rule should be useful to anyone concerned with distribution and handling of fresh fish. It emphasizes the advantage of maintaining the product at as low a temperature as possible. The slide rule predicts the quality of fish in terms of "days held in ice."

The slide rule shown in the figure that follows has three parts: (1) the day/temperature (D/T) scale, (2) the shelf life (S) scale, and (3) the index. Note that the temperature lines are horizontals and that the day lines are diagonals.

8.42 STUDIES ON TRACE METALS

Anonymous
Environmental Science & Technology 7, No. 8, 684-686 (Aug. 1973)

This report is based upon papers delivered at the 7th Annual Conference on Trace Substances in Environmental Health held at the University of Missouri recently. The papers emphasized the need for quantitative information on the metal content of the water, food, and air consumed by man and on other sources of metal intake. Acquiring this information will show patterns relating trace metals to human health and disease. The chemical form of metals may be important in toxicity. An example given is methyl mercury which can pass through the blood-brain barrier and cause damage to the central nervous system. Other researchers found that small concentrations of cadmium in rats protected them against mercury intoxication. Pretreatment of the animals with subtoxic doses of cadmium increased the concentration of metallothionein in the liver and kidneys which enhanced the uptake of mercury by these tissues. However, the mercury was bound to the metallothionein which prevented mercury poisoning of the liver and kidney tissues. Other studies showed that cadmium concentration in human tissues is increased by contacts with cosmetics, cigarettes, galvanized pipes, and ingestion of food grown with synthetic fertilizers. Cadmium has been linked to cancer, kidney ailments, hypertension, and other cardiovascular conditions. In addition, cadmium has been linked to a disease called itai-itai among people who live downstream of a mine in Japan. The cadmium in the drinking water induced a negative calcium balance in the people. In a related study, rats given cadmium in their diets exhibited a loss of calcium from their bones. This condition could be a possible explanation for the disease

8. (0.7) SHRIMPS OF KARACHI WATERS. I. DETERMINATION OF FOOD VALUE AND PHYSICOCHEMICAL CONSTANTS OF FAT AND PROTEIN

Haq, S. A., Iqbal H. Siddiqui, and Shamsuddin Qureshi (Pakistan Counc. Sci. Ind. Res. Lab., Karachi, Pakistan)
Chemical Abstracts 78, No. 7, 41741w (Feb. 19, 1973)

8.42 COPPER CONTENT OF FOOD

Pennington, Jean T., and Doris Howes Calloway (Dept. of Nutritional Sciences, University of California, Berkeley, CA 94720)
Journal of the American Dietetic Association 63, No. 2, 143-153 (Aug. 1973)

Data are given on the copper content of foods. Such information is useful in determining the adequacy of copper in our daily diets and in planning copper-restricted diets. The table of data on foods gives information on internal organs (such as animal hearts, kidneys, livers, etc.,); muscle meat and meat products; poultry and game muscle; chicken eggs; fish and shellfish; dairy products; prepared dishes; soups; nuts and seeds; fruit and fruit products; vegetables and vegetable products; cereals, cereal products, and starches; desserts and sweet breads; sweets; condiments, spices, and flavorings; salad dressings, oils, and fats; beverages; alcoholic beverages; baby foods; and miscellaneous items used with foods. Data on the copper content of fish and shellfish are shown in the table that follows. FTP
[1 table, 67 references]

8.42 MINERAL COMPOSITION OF FISH AND NONFISH SEAFOODS
(6.55)

Leonova, L. I., and S. Castellano (U.S.S.R.)
Chemical Abstracts 78, No. 7, 41826c (Feb. 19, 1973)

8.42

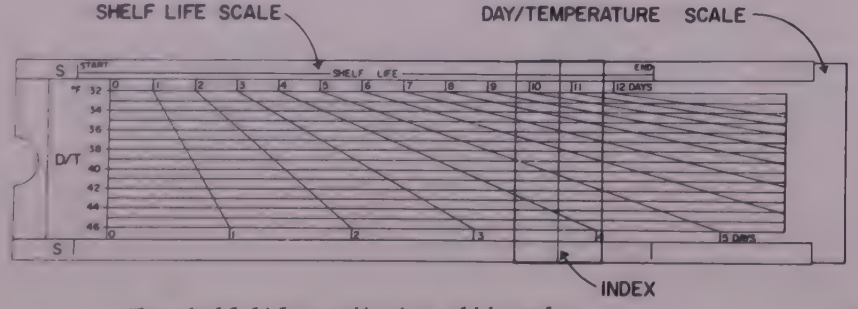
Food item [1]	Number of samples	Copper content	
		Range	Mean
		mg/100 g	mg/100 g
Catfish	3	.14-.25	.17
Clams	4	--	.00
Codfish	12	.00-.55	.18±.22
Codfish, steamed or fried	3	.07-.10	.08
Crab meat	17	.01-6.50	.89±1.09
Crab, canned	3	.27-3.00	1.52
Flounder	5	.01-.25	.15±.10
Haddock	27	.01-.33	.19±.13
Herring	5	.01-.36	.19±.15
Lobster	7	.26-4.00	1.69±1.33
Mackerel	5	.00-.34	.19±.13
Mullet	10	.00-.28	.10
Oysters	430	.03-160.00	17.14±41.97
Pike	3	.16-.34	.22
Salmon	5	.01-.40	.20±.16
Salmon, canned	14	.05-.08	.07
Sardines, canned	13	.00-0.5	.04
Scallops	2	.01-.23	.12
Shrimp (without shells)	8	.24-1.20	.60±.40
Shrimp, canned	1	--	.17
Shrimp, boiled	2	--	.30
Sole	4	.03-.16	.07
Trout	5	.01-.33	.17±.16
Tuna	1	--	.50
Tuna, canned	3	.01-.23	.12
Whitefish	1	--	.19

[1] Raw food items unless otherwise indicated.

7.8

The slide rule should only be used when the history of the fish is known or can be estimated fairly accurately.

The slide rule was developed with Federal research funds, and there is no restriction as to its use by the public. Anyone having questions or needing assistance in the fabrication of the slide rule is requested to contact the authors at the Atlantic Fishery Products Technology Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Emerson Avenue, Gloucester, Massachusetts 01930.
[1 figure, 3 references]



The shelf life prediction slide rule. FTP

8.42

itai-itai. Cadmium was also found to depress serum copper and ceruloplasmin (a blue, copper-containing protein) levels in rats receiving low-level copper diets. Copper studies show that a number of disease conditions cause its deficiency. Abnormal behavior in rats resulted when given 80% less copper than a control group. Other researchers suggested that reduced copper in the diet is related to reduced detoxification of ingested chemicals such as aniline and phenobarbital. Molybdenum was found to interfere with copper metabolism; it also decreased calcium release from bone and decreased uptake of calcium. Molybdenum is also a possible environmental contaminant. Other reports described the interactions of zinc, selenium, lead, iron, and manganese.
[3 photographs] SW

8.42 DISTRIBUTION OF CADMIUM IN BIOLOGICAL MATERIALS.
(9.19) 2. CADMIUM AND ZINC CONTENTS OF FOODS
Ishizaki, Atinobu, Masaaki Fukushima, and Michiko Sakamoto (Sch. Med., Kanazawa Univ., Kanazawa, Japan)
Chemical Abstracts 78, No. 7, 41798v (Feb. 19, 1973)

8.42 SURVEY OF THE SELENIUM CONTENT OF FISH FROM 49 NEW YORK STATE WATERS
Pakkala, Irene S., Walter H. Gutenman, Donald J. Lisk, George E. Burdick, and Earl J. Harris (New York State Coll. Agric. Life Sci., Cornell Univ., Ithaca, N.Y.)
Chemical Abstracts 78, No. 9, 53560z (Mar. 5, 1973)

8.8 (0.5) MICROBIOLOGICAL, CHEMICAL, AND ORGANOLEPTIC CHARACTERISTICS OF FROZEN BREADED RAW SHRIMP

Vanderzant, C., A. W. Matthys, and B. F. Cobb III (Animal Science Department Texas A. & M. University, College Station, TX 77843)
Journal of Milk and Food Technology 36, No. 5, 253-261 (May 1973)

This paper reports data on the bacteriological, chemical, and organoleptic conditions of raw shrimp and plant processed frozen breaded raw shrimp. In addition, data are given on the distribution of the microbial flora of 12 retail samples of frozen raw breaded shrimp. Thirty percent of the raw shrimp received for processing showed bacterial counts in excess of 10^6/g. Fifty-six percent of the frozen raw breaded shrimp (as processed at the plant) had bacterial counts over 10^6/g. Salmonella species and Vibrio parahaemolyticus were not isolated from plant processed frozen breaded raw shrimps. The organisms initially present in the frozen breaded raw shrimp were species of Pseudomonas, Achromobacter, Bacillus, Moraxella, Microbacterium, Micrococcus, or coryneforms. When the samples were held at 0° to 10° C, the numbers of species of Microbacterium, Micrococcus, Bacillus, or coryneforms increased. Apparently, the batter and breading contributed to the large numbers of species of Bacillus and Microbacterium.

Fifty-two percent of the retail samples of frozen breaded raw shrimp had aerobic plate counts of 10^6/g or higher. Gram-positive forms (Bacillus, Microbacterium, and coryneform bacteria) were the more predominant in these retail samples.

Additional data are given on the trimethylamine, total volatile nitrogen, and odor scores of the various samples.

[7 figures, 8 tables, 24 references] FTP

9. BETWEEN COMPLACENCY AND PANIC

Handler, Philip, and Alexander Zucker (National Academy of Sciences, Washington, DC 20418)
Federation Proceedings 32, No. 7, 1748-1753 (July 1973)

The manner in which society addresses the long-term aspects of population control, resource use, energy production, pesticide and fertilizer use, and air and water pollution will have a profound effect on the natural environment. The economic, social, and cultural environment of future generations will also be affected. Few people foresaw the emergence of the "environmental crisis." There is general understanding that environmental effects, subtle, long delayed, and initially unperceptible can hold the threat of severe, perhaps irreversible, consequences. Policy making in the environmental area is very difficult because it requires estimation of second and third order effects, and there is little record of success in such endeavors. The formulation of a national energy policy is now vastly complicated by environmental concerns. The prudent national course is to prepare for alternative sources of energy that may be safer, simpler, and that have no serious environmental effect. In a few years, the costs of developing these new sources of energy and protecting the environment may prove to be as great as the national total of corporate profits. The branches of science that describe large-scale phenomena--a tropical forest, the ozone layer of the stratosphere, the plankton of the sea, or a city of people--need more attention because they hold the answers to environmental strategy. Society may become unwilling to support fundamental biological and physical sciences because of the environmental issues

9.1 (1.3) BARRIERS TO RANGE EXTENSION OF ATLANTIC AND PACIFIC SALMON IN ARCTIC NORTH AMERICA

Salonius, P. O. (Canadian Forestry Service, Durham Bridge, RR9, Fredericton, New Brunswick, Canada)
Arctic 26, No. 2, 112-122 (June 1973)

The enormous potential of subarctic fresh water in the Hudson Bay and Mackenzie drainage areas for the spawning and rearing of anadromous salmon may be worth testing. Successful colonization would provide the basis for new fisheries in both areas. The potential of the Mackenzie drainage system is suggested by the similarities and proximity of spawning and nursery areas now used in Alaska and the Yukon area. Introduction of pink and chum salmon in 1955-56 in southern Hudson Bay and James Bay (an arm of Hudson Bay) was unsuccessful. However, later experience with pink salmon introductions in Newfoundland has developed information which may provide for more successful future introductions in Hudson Bay. If a race of salmon is transferred to a habitat that resembles the location from where it originated, the chances for survival are enhanced. Consequently, the author suggests that Atlantic salmon plantings in Hudson Bay would be more successful than Pacific salmon plantings. Salmon stock originating in the rivers emptying into Ungava Bay would be the logical choice for introduction into the rivers draining the east coast of Hudson and James Bays. The author believes that three Pacific salmon--chinook, sockeye, and coho--would successfully colonize the Mackenzie River system that empties into the Arctic Ocean. The author also suggests that the introductions should be of surface-sterilized, disease-free eggs which are to be hatched in the new areas. Close track of the populations should

9.12 CHEMICAL BASIS FOR HOMING OF ATLANTIC SALMON (SALMO SALAR) TO A HATCHERY

Sutterlin, A. M. (Dept. of Environment, Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada), and R. Gray
Journal of the Fisheries Research Board of Canada 30, No. 7, 985-989 (July 1973)

The purpose of this study was to assess the precision of the homing of hatchery-reared Atlantic salmon to the hatchery. The authors determined the return location of hatchery reared and wild Atlantic salmon recovered from fish traps at a hydroelectric dam and at a hatchery 1,500 m downstream of the dam. They found that 97% of the ascending wild salmon returned to the dam and 3% were found at the hatchery site. Sixty-seven percent of the hatchery-reared fish returned to the hatchery and 33% were found at the dam.

The nature of the active components responsible for the homing of hatchery fish is not known. In additional tank tests, adults of hatchery-reared fish preferred hatchery effluent over river water; wild fish showed no preference to either water. Hatchery fish and wild fish avoided well water (a component of hatchery effluent). Adding $CuSO_4$ to hatchery effluent altered its attractiveness to the hatchery salmon.

[2 figures, 2 tables, 15 references] FTP

9.

requiring practical answers. The question of the environment finally becomes a personal matter. What is the individual willing to give up to ensure a healthy environment for himself and the future inhabitants of the planet? The sacrifice may be much more severe if protection of the environment requires an early braking of economic growth. Some social freedom may have to be surrendered to protect the environment. The responsibility of controlling the world ecosystem now rests on man. He must take upon himself functions which formerly were considered to be the prerogatives of nature or Providence.
[6 references] SW

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9. EFFECT OF ENDOGENOUS FACTORS IN MARINE BIOGEOCHEMISTRY

Florovskaya, V. N. (Mosk. Gos. Univ., Moscow, U.S.S.R.)
Chemical Abstracts 79, No. 5, 28676e (Aug. 6, 1973)

9.17 PRELIMINARY STANDING STOCK AND BIOMASS ESTIMATES OF SEABIRDS IN THE SUBARCTIC PACIFIC REGION

Sanger, Gerald A. (National Marine Fisheries Service, Northwest Fisheries Center, Seattle, WA 98102)
In Biological Oceanography of the Northern North Pacific Ocean, A. Yositada Takenouti (ed.), published by Idemitsu Shoten, Tokyo, Japan (1972), pp. 499-611

The estimated standing stocks of seabirds in the subarctic Pacific region totaled about 8 million in the winter and 51 million in the summer. The densities of seabirds were highest in the coastal areas, but the greatest number of birds were estimated to be in the central subarctic domain. The family of shearwaters (Procellariidae) were predominant in the summer, and they and the family Laridae (gulls and terns) and Alcidae (auks, murres, and puffins) were common in the winter. Seabirds consume an estimated 0.6 to 1.2 million tons of food per year in the region and excrete about 120,000 to 240,000 tons of feces. In the central subarctic domain, the shearwaters are responsible for 61% of the total intake of food by birds. Local consumption of plankton and nekton (fish and other forms) is increased by the flocking of the seabirds, and flocking causes the dropping of feces in a concentrated area to fertilize the continued production of the plankton and nekton. Very little is known about the distribution, abundance, and movements of seabirds in the region and of their relationship with the pelagic environment. Seabirds are prime candidates for detailed studies of oceanic ecosystems because they can be studied more readily than other forms of life.
[5 figures, 5 tables, 66 references] SW

9.12 (9.11)(9.6) ABYSSAL ENVIRONMENT AND ECOLOGY OF THE WORLD OCEANS

Menzies, Robert J. (Florida State University, Tallahassee, Fla.), Robert Y. George, and Gilbert T. Rowe
John Wiley & Sons, Inc., New York (1973), xxiii + 488 pp. Price not given.

This book of 14 chapters begins with a history of abyssal biological research and its evolution to modern times. In another chapter, the collecting methodology and the preparation of benthic and abyssal specimens are analyzed. Dredges and crab samplers are described and deep bottom trawling techniques are compared for quality of data generated. The authors are more concerned about defining the different fauna living at abyssal depths rather than the physicochemical conditions or bathymetry. The authors show that species living in the archibenthal or abyssal zones in the tropics emerge toward the continental shelf in the poles. Other species live closer to the surface in the northern climate and submerge to lower depths in lower latitudes of the tropics. In the last part of the book the authors establish the changes that have occurred in the various animal groups throughout geological times. They have proposed a new scheme for the abyssal provinces based upon temperature and bottom topography. The book is well illustrated with figures and photographs; it has an extensive modern bibliography, plus lists of reports from men noted for their work in deep-sea ecology. Also included are reports relating to expeditions from the United States, Netherlands, Sweden, Denmark, and the U.S.S.R. There is an index to genera and species mentioned in the text, a subject index, and an author index. SW

9.1 (1.3)

be maintained until the colony is self sustaining. If commercial and sport fisheries are developed in these remote areas, economic benefits would be gained by the native peoples; in addition, the establishment of the fisheries would influence the care that would have to be taken by the encroaching destructive exploiters of the natural resources.
[2 figures, 33 references] SW

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9. HYDROCHEMICAL CHARACTERISTICS OF LAKES IN THE INTERFLUVIAL AREA OF THE SHANDRIN AND SUNDRUN RIVERS

Bryukhanov, I. M., and A. A. Shokhireva (U.S.S.R.)
Chemical Abstracts 79, No. 2, 9624v (July 16, 1973)

9.12 (9.6) PACIFIC MARINE FISHES. BOOK 1

Yasuda, Fujio, and Yoshio Hiyama (Edited by Warren Burgess and Herbert R. Axelrod)
T.F.H. Publications, Inc., New Jersey (1972), 280 pp. Price $20.00.
Leslie W. Knapp (reviewer)
Transactions of the American Fisheries Society 102, No. 3, 669-670 (July 1973)

This is the first of a proposed series of volumes covering the tropical Pacific marine fishes. It contains 488 color plates of coral reef fishes, mostly from the Ryukyu Islands and adjacent areas of the Western Pacific. It includes representatives of over 40 families of fishes and emphasizes the Pomacanthidae, Chaetodontidae, and Pomacentridae. The reviewer believes the series should be of interest to layman and ichthyologists because of the excellent color photographs.

FTP

9.12 (0.119)(2.116) SONIC TAGS ATTACHED TO ALASKA KING CRAB

Monan, Gerald E., and Donald L. Thorne (National Marine Fisheries Service, Northwest Fisheries Center, Seattle, WA 98112)
Marine Fisheries Review 35, No. 7, 18-21 (July 1973)

A system for monitoring the location and movement of free-moving Alaska king crab in their natural environment is described. The sonic tag and related ultrasonic tracking equipment were used on crab in the Bering Sea near Unalaska, Alaska. Feasibility tests indicated the system appears to be a feasible tool for aiding in the harvest and management of king crab.
[3 figures, 1 table, 6 references]

Authors' abstract

9.15 (1.85) A NEW FUNGUS DISEASE OF THE WHITE SHRIMP PENAEUS SETIFERUS

Lightner, D. V., and C. T. Fontaine (National Marine Fisheries Service, Gulf Coastal Fisheries Center, Galveston, TX 77550)
Journal of Invertebrate Pathology 22, No. 1, 94-99 (July 1973)

The presence of the disease first became apparent in larval shrimp in the second protozoal stage and disappeared as the shrimp reached the first mysis stage. The disease is caused by a species of Lagenidium. The fungal mycelium (vegetative part of a fungus) gradually invaded and replaced the tissues within the larval shrimp. The thorax, abdomen, eye stalks, and the swimming appendages of the larvae were filled with the hyphea (filamentous parts of mycelium) of the fungus. The destruction of tissue immobilized the larval shrimp. The hyphae were irregular and branched, and yellow green in color with many round, refractive oil droplets. Sporogenesis began after the larval shrimp were immobilized. Growth of the fungus was slow and limited in thioglycolate medium. The fungus grew rapidly on Sabouraud dextrose agar enriched with 2% salt and shrimp homogenate when incubated for 4-5 days at 27° C. In Sabouraud broth the hyphea of the fungus appeared similar to those observed in the shrimp larvae. Forty-eight h after the disease began and the remaining larvae reached the first mysis stage, mortality stopped and all indications of disease disappeared. The infection was limited to one tank in the laboratory and mortality reached 12.4%. The fungus was also infective to larval brown shrimp, P. aztecus.
[10 figures, 9 references]

SW

9.16 OBSERVED LIVER CHANGES IN RAINBOW TROUT (SALMO GAIRDNERI) FED VARYING LEVELS OF A CASEIN-GELATIN MIXTURE AND HERRING OIL IN EXPERIMENTAL DIETS

Lee, D. J., and J. H. Wales (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 30, No. 7, 1017-1020 (July 1973)

In most nutritional studies with animals, growth is the primary criterion used to evaluate diets; less attention is given to the effects of the diet on the structure of the tissues and organs. In this study, young rainbow trout were fed for 18 weeks semipurified diets containing varying levels of herring oil (8% to 24%), a protein mix consisting of 70% casein and 30% gelatin (35.56% to 53.33%), and starch (8.90% to 26.67%). The trout fed diets containing 53.33% protein and herring oil levels of 8% and 16% developed livers with abnormal nuclei, bile duct proliferation, and some parenchymal cell injury. Trout fed diets of the same level of protein but with 24% herring oil did not develop these liver abnormalities. When the protein levels were increased along with a lowering of the starch levels, large livers with high glycogen content were formed in the trout; this effect was not as pronounced at the high level (24%) of herring oil. These liver abnormalities apparently did not impair growth of the trout because their weight gains were unrelated to the condition of the liver tissues.
[2 tables, 9 references]

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9.13 (9.19) UPTAKE AND BIOTRANSFORMATION OF PHENYLMERCURIC ACETATE BY AQUATIC ORGANISMS

Fang, S. C. (Dept. of Agricultural Chemistry, Oregon State University, Corvallis, OR 97331)
Archives of Environmental Contamination and Toxicology 1, No. 1, 18-26 (Feb. 1973) (Springer-Verlag New York Inc., 175 Fifth Ave., New York, NY 10010)

Phenylmercuric acetate (PMA) is used as a slimicide in the pulp and paper industry; some PMA may be discharged into waste water and thus become a possible contaminant in water systems. In this study, the researchers determined the uptake and metabolism of ^{203}Hg-labeled PMA by guppies (Lebistes reticulatus), snails (Helisoma campanulata), elodea (Elodea canadensis), and coontail (Ceratophyllum demersum). Glass aquariums of 4 to 7 liters were used (with aeration). ^{203}Hg-PMA was added to give an initial concentration of PMA ranging from 5×10^{-8}M to 5×10^{-7}M. The organisms were placed in the water, and samples of organisms and water were taken periodically for examination during the exposure period of about 96 h. No radioactivity remained in the water after 96 h; the total uptake by guppies and elodea was about 12% of the ^{203}Hg-PMA in the aquarium, with the remainder probably being lost to the air through evaporation. The organisms readily take up the PMA, and the amount of uptake is related to the concentration level and the time of exposure. The PMA absorbed is converted mainly to inorganic mercury, with ethylmercuric chloride as a minor metabolic product. ^{203}Hg is not readily eliminated from the guppy, elodea, and coontail when they are placed in fresh water after exposure to PMA; the biological half-life of the ^{203}Hg residues ranged from 43 to 58 days.
[4 figures, 3 tables, 5 references] FTP

9.16 MECHANISMS CONTROLLING MIGRATION OF SOCKEYE SALMON FRY

Brannon, E. L.
Bulletin No. 21 of the International Pacific Salmon Fisheries Commission, New Westminster, British Columbia, Canada (1972), 86 pp.

The long and rigorous migrations of Pacific salmon through ocean and river to return to their spawning stream have attracted the attention of many observers. The migrations of young salmonid fry from their incubation site to their freshwater rearing nursery area, not as well known, were investigated to elucidate the life history of these fish.

Sockeye salmon fry from six areas in the Fraser River watershed were investigated to determine the causes of migratory behavior. Different migratory behavior patterns were displayed by fish from each of the six populations. Size and age were found not to be a causal mechanism; instead, responses were made to the current velocity of a stream. In addition, olefactory stimuli relating to source of water and odor influenced directional behavior. Temperature of the water, and light, influenced the intensity of the responses, but they were not directing factors. In the absence of current in the lake environment, light appeared to provide the stimulus for migration.

The evidence provided by the study indicates that fry migration is a genetically based behavior pattern influenced by current velocities, olefactory stimuli, and other race specific factors. In the rehabilitation of areas barren of fish, not only is an assessment of changes in the aquatic environment necessary, but the migration behavior of sockeye fry must be also considered.
[20 figures, 24 tables, 41 references] SW

9.12 (9.125)(9.6) PACIFIC FISHES OF CANADA

Hart, J. L. (St. Andrews, New Brunswick, Canada)
Fisheries Research Board of Canada Bulletin 180, Ottawa, Canada (1973), ix + 740 pp. Price $9.60.

This book contains descriptions of 325 kinds of fishes with regard to common and scientific names; observations on head spines, fins, counts of gill rakers and vertebrae; in addition, size, distribution, utilization, and life history of the fishes are given. A sketch of each species with a short description are shown for aid in recognition. Analytical keys for assistance in recognizing the species are included; more than 54 new species of fish have been identified and included. Color photographs of five species of salmon show the contrast between fresh-run and spawning individuals. A gazeteer of locations mentioned in the text, a glossary of terms used, notes on species illustrations, a large list of references, and an index of common and scientific names may be used to expand the initial uses of the book by students and laymen. SW

9.15 SCOLECOBASIDIUM HUMICOLA, A FUNGAL PATHOGEN OF FISH

Ross, A. J., and W. T. Yasutake (Bureau of Sport Fisheries and Wildlife, Western Fish Disease Laboratory, Seattle, WA 98115)
Journal of the Fisheries Research Board of Canada 30, No. 7, 994-995 (July 1973)

The previously undescribed pathogen (S. humicola) of fish was isolated from coho salmon. In natural infections, the kidney of the fish was affected most. The disease was difficult to transmit experimentally and it seems to be weakly contagious.
[3 figures, 4 references] FTP

9.14 CONTENT OF AMINO ACIDS IN THE PROTEINS OF LOWER AQUATIC ANIMALS AND ITS SIGNIFICANCE FOR FISH NUTRITION

Albrecht, Marie Luise, and J. Wuensche (Forschungszent. Tierprod. Dummerstorf/Rostock, East Germany)
Chemical Abstracts 78, No. 9, 56788r (Mar. 5, 1973)

9.15 ATTEMPT TO LIMIT THE OUTBREAK OF ILLNESS IN FISH HATCHERIES

Hastein, Tore (Dir. Jakt, Viltstell Ferskvannsfiske, Veterinoerinst., Norway)
Chemical Abstracts 79, No. 3, 16001t (July 23, 1973)

9.16 (1.0152) (9.6) CHINESE FRESHWATER FISH CULTURE (CHUNGKUO TAN SHUI YÜ LEI YANG CHIH HSÜEH)

Prepared by 14 members of the Committee to Summarize Experience on Freshwater Fish Raising, in cooperation with the Ministry of Fisheries and the Chinese Academy of Sciences, Peking, China (1961), 612 pp.
Tyson R. Roberts (Museum of Comparative Zoology, Cambridge, MA 02138), Choon-Ho Park, and Robert Straus (reviewers)
Transactions of the American Fisheries Society 102, No. 3, 668-669 (July 1973)

This book is intended for persons involved with the commercial culture of fish, and for members of scientific research organizations and educational institutions. It appears to be the most recent, comprehensive, and authoritative account of the fish culture practiced in China. The various topics discussed in the 14 chapters include: history; reproduction of the species of fish; feeding of fishes; raising fry; culture of fish in ponds, in rivers, in rice paddies, and in reservoirs; control of fish diseases; harvesting, preservation of the harvest; and preparation of byproducts (meal, oil, and glue). In 1958, the Chinese national output of aquatic products was 6,020,000 tons of which rearing in fresh and in salt water provided 2,570,000 tons or 42.6% of the total. The predominant species used in aquaculture consist of (listed in order of decreasing importance): (1) Ctenopharyngodon idella, (2) Mylopharnygodon piceus, (3) Hypophthalmichthys molitrix, (4) Aristichthys nobilis, (5) Cyprinus carpio, (6) Carassius auratus, (7) Parabramis pekinensis, (8) Cirrhina molitorella, (9) Elopichthys bambusa, (10) Mugil cephalus, (11) Siniperca chautsi, (12) Ophiocephalus argus, (13) Parasilurus asotus,

9.16 (9.3) RACEWAYS; EXOTIC SPECIES MOST AFFECTED BY PROPOSED E.P.A. DISCHARGE PERMITS

Culley, Dudley D., Jr.
American Fish Farmer & World Aquaculture News 4, No. 8, 9-12 (July 1973)

The National Pollutant Discharge Elimination System (NPDES) is administered by the Environmental Protection Agency (EPA). Part 125 of title 40 of the Code of Federal Regulations contains the rules under which the policies and procedures of the NPDES are prepared. A proposal to amend the regulations has been announced by the EPA. Two types of commercial aquaculture operations will be affected by the change--raceway culture and culture of nonnative fish.

Fish culture operations involving raceway production, with water discharges occurring more than 30 days per year, will require a permit if the proposed rule change is adopted. To avoid the requirement for a permit, the alternatives are either the installation of a holding lagoon or recirculation of waste water through purification systems so that discharges can be held to less than 30 days per year. The author suggests that a permit system would serve as an economic incentive for aquaculturists to become more efficient in their operations. For example, to maintain the approved quality of water discharged from a fish farm, feed must be utilized at a high level, otherwise unused feed contributes to the wastes in the discharged water and adds to the costs of the operation.

Control of the cultivation of nonnative species is necessary because of the threat that pathogens or parasites harmful to native ecosystems or to man might be

9.16 EXPERIMENTS IN THE NUTRITION OF CARP GROWING IN CAGES

Shiloh, Shaul (Ein Hamifraz), and Shlomo Viola (MILOUBAR, D.N., Ashrath)
Bamidgeh 25, No. 1, 17-31 (Mar. 1973)

The purpose of these feeding trials with carp was to obtain further information on certain problems involved in the intensive culture of carp, namely, the optimum ratio of energy to protein, the optimum nutrient density, and the effect of fiber on energy utilization. The carp were maintained in wire cages (2.0 x 1.0 x 0.6 m) at a stocking density of 200 fish per cage. The wire cages were suspended in a pond, near the embankment. Experimental rations (in the form of 4 mm pellets) were fed twice daily to the carp at a rate of 4% of the weight of the fish. The feeding tests lasted about 1 month; the fish were weighed every 10 days during this period. All rations contained 25% crude protein but differed in their metabolizable energy content. Sterilized cow manure or poultry litter was included in some of the feeding trials. Also, soybean oil (4% or 5%) was added to the pellets to determine the effect on the growth of the carp.

The weight increase of the carp correlated directly with the energy content of the rations. The highest growth rate was obtained at the energy to protein ratio of 118 to 1; however, a still higher ratio may be necessary for optimal growth. The growth rates of the carp were reduced by the inclusion of cow manure or poultry litter in the rations; apparently the fast growing carp are unable to utilize fiber as a source of energy. The growth rate of the carp increased when soybean oil was added to the pellets.
[6 figures, 6 tables, 10 references] FTP

9.17 MANAGEMENT OF FISHERIES; ECOLOGICAL SUBSYSTEMS

Dickie, L. M. (Marine Ecology Laboratory, Fisheries Research Board of Canada, Bedford Institute, Dartmouth, Nova Scotia, Canada)
Transactions of the American Fisheries Society 102, No. 2, 470-480 (Apr. 1973)

This paper was presented to the American Fisheries Society at a meeting in New York, N.Y. in 1970. The author suggested that there is a critical lack of knowledge in the ecological branch of science upon which managers and their scientist advisers depend for guidance. He also commented that there is an abundance of data and observations in many fisheries; what is lacking are the kinds of generalizations which enable testable predictions to be formulated about exploited ecosystems. The author believes that there is a limited ability available to predict the influence of various factors on the catch of fish. The author reviewed fishery models relating fishing effort to the rate of exploitation based on various inputs. He suggested that the conformation of statistical data to the models is too poor to apply to fishery management.

The author believes that more effort must be spent on developing generalizations which will help to simplify fishery systems that are being exploited; in addition, he suggests that more research effort be devoted to the measurement of the overall fishery system properties rather than continue more intensive description of changes in the component parts such as sizes of catch or numbers of boats. The recent history of aquatic ecology and fisheries indicates that these stages are developing.
[2 figures, 24 references] SW

9.16 THE RESPONSE OF RAINBOW TROUT TO VARYING PROTEIN/ENERGY RATIOS IN A TEST DIET

Lee, D. J., and G. B. Putnam (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Nutrition 103, No. 6, 916-922 (June 1973)

Nine semipurified diets containing protein/energy ratios that ranged from 73 to 162 mg protein/kilocalories were fed to young rainbow trout for 18 weeks. A casein-gelatin (70-30) mixture and herring oil were each fed at three levels in a factorial type of experiment. Each of the casein-gelatin levels (36, 44 and 53%) was fed at each of the fat levels (8, 16 and 24%). Cornstarch was added at the expense of the casein-gelatin mix to adjust dietary protein levels. Caloric intake regulated feed consumption; and except for diets low in both fat and protein, no significant differences in weight gains were noted, although feed and energy conversions were markedly influenced. Higher protein/calorie ratios were positively correlated with liver size, level of liver sugars, percentage body fat, percentage body protein, and negatively correlated with percentage liver lipids, size of gastrointestinal tract and gain/gram ingested protein. These correlations were observed for similar protein/calorie ratios regardless of the dietary levels of protein and lipid.
[5 tables, 17 references] Authors' abstract

9.17 (9.19) ENVIRONMENTAL EFFECTS OF HYDRAULIC DREDGING IN ESTUARIES

May, Edwin B. (Alabama Dept. of Conservation and Natural Resources, Marine Resources Division, Dauphin Island, AL 36528)
Alabama Marine Resources Bulletin No. 9, Marine Resources Laboratory, Dept. of Conservation and Natural Resources, Dauphin Island, AL 36528 (Apr. 1973), 85 pp.

The purpose of this study was to determine the immediate and long-term physical, chemical, and biological effects of hydraulic dredging and open water spoil disposal in estuaries, with particular emphasis on Mobile Bay, Ala. The author concludes that hydraulic channel and shell dredging and open water spoil disposal have little significant immediate effect on water quality in Alabama estuaries. Practically all the sediment discharged by the dredges settles rapidly and is transported by gravity along the bottom as a separate flocculated density layer; the potentially harmful components of the mud are not dissolved in the water. Dredging results in a limited and temporary reduction in benthic organisms. The spoil piles (from channel dredging) can indirectly affect the ecology and usefulness of estuaries by interfering with the circulation of water and by altering the salinity. The water and sediment in coastal Alabama are similar to many other estuaries and thus the observations made in the present study should be applicable in other areas, because basic hydrological concepts control dredge effluent dispersion and subsequent effects on water quality.
[27 figures, 13 tables, 100 references] FTP

9.16 (1.0152)(9.6)

(14) Erythroculter ilishaformis, (15) Xenocypris argentea, (16) Acipenser sinensis, (17) Hermiculter leucisculus, (18) Pseudobagrus fluvidraco, (19) Esox reicherti, and (20) Hucho taimen. The family Cyprinidae includes the first nine species. About one-half the entire inland cultured fish harvest consists of the first four species (grass carp, black carp, silver carp, and big-head carp).

Library of Congress call number for this book is QL634. C5 C54; the copy examined by the reviewers is in the Harvard-Yenching Library, call No. 7748/5631. The book has 216 figures, 10 color plates, and 90 tables. FTP

9.16 (9.3)

introduced through the discharged waste water. Carp, goldfish, and brown trout are excluded from the category of nonnative fishes. Exotic fishes also may involve the risk, if they escape into the environment, of becoming destructive nuisances or hazards in an established ecology. Universities and research institutions are subject to the same rule change. The author suggests that more effort from other agencies must be exerted to control the introduction and management of nonnative species which the proposed permit system will not affect.

Fish rearing operations conducted in closed ponds will not require a permit under the proposed rule change. SW

9.16 CAGE FOR BREEDING SHELLFISH

Halaunbrenner, Lazare Nathan (17 bd. Edgar Quinet, Colombres, France) (pat.)
U.S. Patent 3,741,159 (June 26, 1973)

This float-equipped cage is used for breeding or storing shellfish, particularly oysters or mussels. FTP

9.19 WATER QUALITY AND FISH LIFE BELOW SEWAGE OUTFALLS

Tsai, Chu-Fa (National Resources Institute, University of Maryland, College Park, MD 20742)
Transactions of the American Fisheries Society 102, No. 2, 281-292 (Apr. 1973)

Earlier reports have indicated that increased biological oxygen demand (BOD) and resulting oxygen depletion, caused by the organic material in sewage discharges in streams, had an adverse effect on fish and other aquatic life. Later workers, in contrast, reported that numbers of individuals and species of fish gradually increased downstream of a sewage outfall, although the dissolved oxygen (DO) had gradually decreased. The author concluded that DO is not the deciding factor in limiting the presence of fish; instead, sewage toxicity may be the major factor in fish distribution downstream of sewage discharges.

Experiments were performed to determine the effects of water degradation on fish depletion, to define water degradation limits for each fish species, and to eventually establish water quality criteria for protection of fish in sewage polluted streams. Of 139 domestic sewage treatment plants studied in Maryland, northern Virginia, and Pennsylvania, three major types were found: type I (the majority) had facilities for sludge activation, aeration, sedimentation, and filtration with effluent chlorination; type II (10 plants) had the same facilities as type I plus a holding lagoon after chlorination of the effluent; type III (4 plants) had the same facilities as type I plus a lagoon with chlorination at the lagoon outlet. Water quality determinations were made from samples taken from upstream and downstream stations at each treatment plant. Standard methods (of the American

9.19 PROFOUND CHANGES COMING IN POLLUTION ENFORCEMENT

Bryson, Dale S. (Enforcement Div., Region V, U.S. Environmental Protection Agency)
Food Engineering 45, No. 6, 68-69 (June 1973)

The Federal Water Pollution Control Act of 1972 is the basis for development of a tight regulatory system which is expected to establish precise, detailed abatement requirements. The regulations will be enforced through simplification of cumbersome legal procedures and exaction of heavy penalties for violations.

The new law requires establishment of effluent limits that a plant will be permitted to discharge into public waterways. Furthermore, by 1977 each industry must apply the best practicable control technology available at that time. The penalties of the law include fines of up to $10,000 per day and other civil remedies and administrative actions. Willful or negligent violations will result in criminal penalties of up to $25,000 per day of occurrence. Every industry will be required to apply for a permit under Section 402 of the law. Each permit will contain, in a single document, the complete schedule of requirements for each individual plant with copies available to state and federal officials and private citizens. Many states already have permit programs, but the Environmental Protection Agency (EPA) is working for an effective national program which includes authorizing the states to apply the regulations.

The EPA has developed a vast amount of information to guide its personnel in determining that a plant is applying the best practical control technology.

Not only will the oxygen demand of wastes be limited but total suspended solids, pH, temperature, oil, heavy metals, and toxic substances will also be limited. One of the major objectives of the EPA will be to ensure cooperation between it and the state agencies to meet the strict requirements of the new law. SW

9.19 TOXICITY, RESIDUE DYNAMICS, AND REPRODUCTIVE EFFECTS OF PHTHALATE ESTERS IN AQUATIC INVERTEBRATES

Sanders, Herman O., Foster L. Mayer, Jr., and David F. Walsh (Fish-Pesticide Research Laboratory, Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Columbia, MO 65201)
Environmental Research 6, No. 1, 84-90 (Mar. 1973)

Phthalic acid esters are widely used as plasticizers, particularly in the polyvinyl chloride plastics. Plasticizers (chemicals) are added to synthetic plastic resins to impart flexibility to the product, to improve workability during fabrication, and to extend or modify properties not present in the original resin. Plasticizers are being used in such large amounts it is conceivable that they could easily, although inadvertently, contribute to environmental pollution. This paper is a report on the toxicology of di-2-ethylhexyl and di-n-butyl phthalate in some freshwater invertebrates.

Five species of crustacea were used as the test invertebrates (scud, Gammarus pseudolimnaeus; glass shrimp, Palaemonetes kadiakensis; crayfish, Orconectes nais; waterflea, Daphnia magna; and aquatic sowbug, Asellus brevicandus) and three species of immature aquatic insects (damselfly nymphs, Ischnura verticalus; burrowing mayfly, Hexagenia bilineata; and midge larvae, Chronomus plumosus). Acute toxicity tests were carried out under static conditions using the method of H. O. Sanders [Bur. Sport Fish. Wildl. Tech. Paper 25 (1969)]. The toxic effect was evaluated as the median tolerance limit (TL_{50}), the concentration of the toxin in water that produces a 50% response in the test organisms under the test conditions.

9.19 MERCURY IN FOOD. A SCIENTIFIC STATUS SUMMARY

Prepared by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition
Journal of Food Science 38, No. 4, 729-734 (May-June 1973)

Since mercury is ubiquitous, everyone consumes trace amounts. It can be found in all food and water, with higher concentrations in foods grown in areas having higher concentrations of mercury in soil. The short-chain alkyl mercury compounds, methyl, dimethyl and ethyl mercury, are more toxic than elemental mercury, inorganic salts of mercury and the aryl mercury compounds. Since mercury is excreted in feces, sweat and exhaled breath as well as in urine, a daily intake of 1.0 mg per day of elemental mercury or inorganic mercury salts appears safe. The USDL [U.S. Dept. of Labor] established an allowable level of 0.1 mg elemental mercury vapor or inorganic salts of mercury and 0.01 mg alkyl mercury per cubic meter of air for industrial exposures. The average U.S. diet contains less than 1/50 this amount. Epidemiological studies in several locations of elevated mercury content show no cases of methyl mercury poisoning resulting from fish consumption in the U.S. F&DA does not allow the sale of fish containing more than 0.5 ppm (0.5 mg/kg) of mercury, and the canned tuna industry now includes mercury content as one of their quality specifications. The naturally occurring element, mercury, does not appear to pose a toxic hazard in the food supply of the U.S. and there is no evidence that alkyl mercury formed by microorganisms in nature has led to methyl mercury poisoning; however, this does not imply there is no reason to control the release of elemental mercury and inorganic salts of mercury into the environment from

9.19 POLYCHLORINATED BIPHENYLS IN SOLID WASTE AND SOLID-WASTE-RELATED MATERIALS

Carnes, R. A., J. U. Doerger, and H. L. Sparks (U.S. Environmental Protection Agency, National Environmental Research Center, Solid Waste Research Laboratory, Cincinnati, OH 45268)
Archives of Environmental Contamination and Toxicology 1, No. 1, 27-35 (Feb. 1973)

Polychlorinated biphenyls (PCBs) are inert, chemically resistant, and fire retarding materials that vary from mobile oily liquids to white crystals and hard transparent resins. They are used in synthetic resins, synthetic and natural rubber, cellulose resins, paint, varnish, wax, and asphalt. They may be applied in dust prevention, moisture proofing, and vapor suppression to prolong the life of pesticides. The PCBS are widely distributed in the environment. The purpose of this study was to determine whether the PCBs were present in municipal refuse and in products of processed refuse. The products examined were collected from different geographical areas in the United States and consisted of material from a compost plant, raw municipal refuse, incinerator fly ash,incinerator gaseous stack emissions residue, and the leachate from a sanitary landfill. The samples were dried, reduced in particle size, separated of extraneous material, and extracted with organic solvent. The sample extracts were cleaned up and then analyzed by chromatography techniques. Evidence of PCBs was found in incinerator residue fines, incinerator fly ash, and compost. No evidence of PCBs was found in raw municipal refuse, liquid condensate from the incinerator, gaseous emissions from the incinerator, and leachate from sanitary landfill. The authors conclude that there is PCB contamination in many parts of the environment, and that disposal of solid waste contributes to this contamination.
[6 figures, 2 tables, 8 references]

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industrial operations. It does indicate the problem has been recognized. Steps have been taken to reduce discharges of elemental mercury and inorganic salts of mercury and to reduce or eliminate use of mercurials in agriculture providing an increasing margin of safety against the possibility of an excessive amount of mercury in any form finding its way into any portion of the U.S. food supply.
[8 references] Abstract reprinted

9.19 1973 POLLUTION CONTROL IN THE MARINE INDUSTRIES

Sullivan, Thomas F. P. (editor) (Washington, D.C.)
Proceedings of the Third International Conference on Pollution Control in the Marine Industries, June 5-7, 1973, Montreal, Quebec, Canada. International Association for Pollution Control, 127 John St., New York, NY 10038 (1973), vi + 400 pp.

The International Association for Pollution Control was created to provide a single, interdisciplinary, neutral forum for use by industry and government in resolving interrelated problems of total environmental protection. This present bulletin contains the proceedings of the Third International Conference on Pollution Control and contains a total of 32 reports dealing with the following sessions: International Policy Consideration (5 papers); Legislation and Regulations (6 papers); Enforcement and Management (5 papers); Port, Marine Terminal, and Marine Waste Management Programs (6 papers); Marine Environmental Management in the Arctic (3 papers); Economic Considerations of Marine Waste Management and Spill Control (3 papers); and International Developments in Marine Pollution Control (4 papers).
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Public Health Association, 1971) were used to determine zinc and copper ions, hardness, chloride, total phosphates, acidity, alkalinity, ammonia nitrogen, total chlorine, DO, turbidity, and detergents. Water temperature and conductivity were also measured. The major damage was found to be caused by chlorine. Types I and III sewage treatment plant effluents resulted in low fish populations downstream. Type II effluent was found to affect fish life the least. Type II treatment combined chlorination with a holding period in a lagoon which disinfected the effluent and provided for dechlorination before being discharged into the stream. Detergent residues in the effluent were not found to be toxic to fish. Sensitivity to total chlorine and turbidity was determined for 45 common species. This information can be used to determine water quality for these two factors in the protection of the species common to the area.

Other factors examined were ammonia and conductivity. Ammonia was not found in significant quantities. Conductivity indicates the concentration of salt ions and is reported to be a limiting factor for fish habitat in natural streams. In this study, conductivity measurements in the stream did not reach a toxic level.
[9 figures, 1 table, 23 references]

SW

9.19 GAS-CHROMATOGRAPHIC ATMOSPHERE STUDIES OF FISHMEAL FACTORIES

Dalager, Soeren (F. L. Smidth and Co. A/S, Copenhagen, Denmark)
Chemical Abstracts 78, No. 24, 150911x (June 18, 1973)

9.19

The accumulation tests were carried out in an intermittent-flow system modified from that of D. I. Mount and W. A. Brungs [Water Res. 1, 21-29 (1967)] that provided a constant level of phthalates over extended periods of time.

The acute toxicities of the two phthalate esters were low and ranged from 2.1 mg/liter to greater than 32 mg/liter. The accumulation of the phthalate residues in the invertebrates was rapid and resulted in body residues 70 to 13,600 times the level in the water. There were no phthalate residues in the waterflea after the organism was exposed to fresh water for 10 days. A 60% reproductive impairment occurred in the waterflea exposed continuously to 3 µg/liter of di-2-ethylhexyl phthalate. The authors conclude that the evidence presented indicates that phthalate esters in small amounts are detrimental to ecologically important aquatic invertebrates, and these compounds should be considered as environmental pollutants.
[3 tables, 22 references]

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9.19 BLOOD AND HAIR MERCURY CONTENT IN FISH CONSUMERS. PRELIMINARY REPORT

Suwari, Perttl, Timo Partanen, Salme Hietala, and Olli P. Heinonen (Inst. Occup. Health, Helsinki, Finland)
Chemical Abstracts 78, No. 11 67933k (Mar. 19, 1973)

9.19 (9.3) MERCURY IN FISH AND THE NEWS MEDIA

Olley, June (CSIRO, Division of Food Research, Hobart, Australia)
Food Technology in Australia 25, No. 5, 270 (May 1973)

The author suggests that the articles on mercury and other pollutants in the scientific literature do not explain clearly whether concentrations are based upon wet weight or dry weight. She also believes that articles in the mass media startle the public by including the high results in studies of pollutants in food expressed in parts per million dry weight; these results are then compared with the regulations of pollutants in food of another country which usually uses parts per million wet weight. Citing an earlier report [Australian Fisheries 31, No. 10, 4 (1972)], the author states that wet weight is implicit in the Australian regulations. She gave practical examples of the parts per million concept. Fish containing 0.5 p/m mercury wet weight (the official limit) means that 1 million lb of fish as eaten (not dry) would contain ½ lb of mercury. Additionally, the flesh of cod contains about 80% water. If the average mercury content of cod taken from the Thames River estuary is 0.36 p/m then the dry-weight mercury content is 5 × 0.36 p/m or 1.80 p/m dry weight. The necessity for specifying wet or dry weight becomes clear when the mercury content expressed as wet weight (0.36 p/m) is acceptable and expressed as dry weight (1.80 p/m) is banned by official standards. The author suggests that the press reports and radio broadcasts should be based on responsible attitudes toward these points; and scientists should make certain that their data are not liable to ambiguous interpretation.
[7 references]

SW

9.19 (9.13) BIOACTIVE COMPOUNDS IN THE AQUATIC ENVIRONMENT: UPTAKE AND LOSS OF DDT AND DIELDRIN BY FRESHWATER MUSSELS

Bedford, J. W. (Bureau of Water Management, Dept. of Natural Resources, Lansing, MI 48914), and M. J. Zabik
Archives of Environmental Contamination and Toxicology 1, No. 2, 97-111 (July 1973)

Freshwater mussels have been used by certain regulatory agencies to monitor pesticide chemicals in fresh waters, even though little is known about the uptake, metabolism, and elimination of insecticide chemicals by these organisms. Also, little is known about the significance of certain levels of pesticide chemicals in the mussels in relation to the levels in the environment. The purpose of the present study was (1) to obtain information on the time required for the pesticide residue level in the mussel to reach equilibrium with the level in water, (2) to determine the half-life of the pesticide residue in the mussel after exposure to the chemical was terminated, and (3) to find out where the pesticide residues (and their metabolites) are stored in the mussel, and to correlate the level of the pesticide residue stored in the mussel with that in the water. The freshwater mussels used were Anodonta grandis, Elliptio dilatartus, and Lampsilis siliquoidea. The mussels were exposed to several levels of DDT and HEOD in natural lake water and in reconstituted distilled water, under continuous flow and constant temperature conditions. [DDT = 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane; and HEOD = 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8a-octahydro-1,4-endo-exo-5,8-dimethanonaphthalene, the principle component of dieldrin.]

9.2 ECONOMIC AND POLITICAL OBJECTIVES IN FISHERY MANAGEMENT

Crutchfield, James A. (Dept. of Economics, University of Washington, Seattle, WA 98195)
Transactions of the American Fisheries Society 102, No. 2, 481-491 (Apr. 1973)

This paper was delivered at a meeting of the American Fisheries Society in New York, N.Y., in Sept. 1970. The author suggests that the condition of the fisheries represents all the major causes of market-mechanism failure, and that public intervention is required to manage them. The industry is faced with the necessity of shifting from single objectives in management to multiple objectives to be used in evaluating programs and policies for publicly funded management goals. These multiple objectives cannot be expressed in a common term such as dollars, but in a cluster of goals such as contribution to net economic output, income redistribution, balance of payments equilibrium, reduction in unemployment, and freedom from arbitrary government action. The author calls these "a multidimensional set of public interest elements," and explicit choices must be made between conflicting objectives as goals of programs and policies. The author believes that an optimal solution to selection of these multiple goals is not likely. However, he suggests that the political process would force some objectives to remain unchanged while subject to other requirements such as uniform fishing gear or a minimum of unemployment in a fishery. In international fishery management, the objectives must be modified to accommodate different national objectives which are based on internal differences. The author states that, "identification of multiple goals is the essential first step toward efficient formulation of fishery programs."

9.2 (9.19) THE POLLUTION CONTENT OF AMERICAN TRADE

Walter, Ingo (New York University)
Western Economic Journal 11, No. 1, 61-70 (Mar. 1973)

The capacity of the environment to assimilate pollutants is a determinant of supply conditions and, thus, is a factor affecting comparative advantage. No doubt national political collectivities will differ to some degree in their assessments of what is an "acceptable" environment (viewed as a matter of social preference). Both of these factors then will have a bearing on the determination of national environmental-control standards, and on the economic cost of meeting the standards. As these costs are passed forward to purchasers or back to producers and taxpayers, and as productive resources are more and more being devoted to maintenance and restoration of environmental balance, the patterns of international trade and investment will inevitably shift. Little information is available on international differences in environmental assimilative capacities, social preferences, and techniques of implementing environmental-control standards. In the present study, the author attempts to determine, at least in a preliminary way, whether environmental-control charges actually incurred by industry form an essentially "trade-neutral" pattern, or whether they are fundamentally export-biased or import-biased. Thus, should U.S. exports be more pollution-intensive than are imports, then whatever pattern of environmental policies eventually emerges among the major trading nations will impact disproportionately on U.S. performance in the international market.

9.2

In discussing the theoretical basis for management, the author believes that the greatest difficulties in development and management of real fisheries will arise in producing satisfactory, short period, biological models of dynamic adjustment, particularly of fish stocks subject to a wide range of hazards besides those of fishing. The crucial issue for management is not how many statistics can be used, but how few are essential to gain most of the benefits of timely action.

The author believes that the decision makers in industry and government are becoming aware of the conflicts over the physical yield versus economic benefits as primary objectives of fishery management. He suggests that fishery administrations at state, national, and international levels cannot develop properly weighted multiple-objective programs because they have no specialists competent to deal with such issues. Adequate staffing with economic and political analysts is necessary as an integral part of management.

[14 references] SW

9.2 (9.19)

Analysis of the entire range of traded goods and services reveals that 1.75% of the value of U.S. exports consisted of pollution-related costs and about 1.52% of the value of U.S. imports. This difference (15% higher for exports) appears not to be significant and suggests that environmental-control measures bearing on the respective supplies of U.S. exports and imports will be trade-neutral, or at worst only marginally biased against the United States. Thus, the product-profile of American exports does not seem to be systematically more or less pollution-intensive than does the product profile of American imports.

However, U.S. trade in individual industries may be vulnerable to increased environmental costs in terms of their international competitiveness. The vulnerability of a specific industry will be greater (1) the more competitive its products are in the international marketplace and (2) the higher its overall environmental-control loading. The author's data indicate that, all else equal, the U.S. international competitive position may be affected in industries such as ordnance and accessories, construction and mining equipment, and plastics, relative to industries such as apparel, fishery and forest products, and footwear, which are already characterized by a substantial competitive disadvantage or where environmental-control costs are not very important.

U.S. trade then will be affected if the world's nations adopt different environmental standards and/or ways of implementing such standards. On the other hand, if all countries apply and enforce identical environmental-control norms, trade flows of individual countries will be affected differently depending on their relative pollution intensity.

[2 tables, 28 references] FTP

9.2 MANAGEMENT OF THE PERUVIAN ANCHOVETA RESOURCE
(1.013)(1.21)

Holmsen, Andreas A. (Dept. of Resource Economics, University of Rhode Island) NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 106-111.

The best available estimate of the maximum sustainable yield of the Peruvian anchoveta resource is 9.5 million metric tons (±1 million). The productive capacity of the purse-seine fleet and the fishmeal factories far exceed this tonnage with the result that the open season is becoming shorter year by year. This paper describes the current fishery management program in Peru and the degree of overinvestment in the industry. It further outlines the alternative methods which can be used to reduce excess capacity in the catching and processing phase and the advantages and disadvantages of the various alternatives.

[3 references] Author's abstract

9.19 (9.13)

The mussels concentrate DDT about 2,400-fold and HEOD 1,200-fold in lake water, and they concentrate DDT about 1,000-fold in reconstituted distilled water. The level of the insecticide chemicals in the mussels reaches equilibrium with the level in the water at a faster rate in lake water than it does in distilled water; also, the insecticide residues have a shorter half-life in the mussels than in the lake water. The half-life of the total DDT residues is 13.6 days in lake water, and the half-life of HEOD is 4.7 days in the same water. The insecticide residue levels are highest in the digestive and reproductive tissues, and lowest in the muscle, mantle, and gill tissues.

Three conclusions evolved from this study: (1) The previous conditioning and insecticide chemical residue burden of the mussel can influence the level of the insecticide chemical attained by the mussel. (2) The type of water into which the mussels are placed can influence the uptake of the pesticides. (3) The level of uptake by the mussels will vary with the insecticide chemical being monitored.

[2 figures, 3 tables, 14 references] FTP

9.19 METABOLISM AND TOXICITY OF POLYCHLORINATED BIPHENYLS

Yoshimura, Hidetoshi (Fac. Pharm. Sci., Kyushu Univ., Fukuoka, Japan) Chemical Abstracts 78, No. 23, 144045b (June 11, 1973)

9.2 (2.06) EXPORT OPPORTUNITIES FOR U.S. FISHERY PRODUCTS

Miller, Morton M., Jukka Kolhonen, and Gregory Hall (Market Research and Services Division, National Marine Fisheries Service, Washington, DC 20235)
Marine Fisheries Review 35, No. 7, 22-30 (July 1973)

Strong and growing world demand for fishery products and the recent favorable realignment of international currencies, from a U.S. viewpoint, combine to create attractive export opportunities for U.S. fishery products. This means expected growth for the traditional items on our export list and, too, an expanded opportunity for the exporting of fishery products derived from underutilized species, that is, species not traded in the U.S. domestic markets to a large degree.

The export possibilities for U.S. seafood products have been expanding considerably. Economic growth and rising incomes worldwide have sparked a growing demand for seafood products, particularly in the industrialized nations. Traditional sources of supply have been hard put to keep pace with the rising demand and buyers are actively searching world markets for new sources. International currency realignments, over the past 14 months, have lowered U.S. prices abroad and have made U.S. products more attractive to many foreign buyers.

The authors indicate an increasing demand for fishery products in Japan and in Europe. The opportunities to expand established markets for fresh and frozen salmon, canned salmon, shrimp, and fish roe are discussed. The potential for exporting new products (squid, Atlantic herring, mullet and other roes, croaker surimi, eels, silver hake, Pacific hake, Atlantic mackerel, mussels, sea urchin, and Alaska pollock) are also discussed.

[9 figures, 9 tables, 5 references] Abstracted in part and extracted

9.3 PUBLIC RIGHTS AND COASTAL ZONE MANAGEMENT

Schoenbaum, Thomas J.
North Carolina Law Review 51, No. 1, 1-41 (Nov. 1972)

The coastal zone was considered to be limitless and to be freely used for recreation and profit. Settlement and industrialization caused pressures of conflecting use patterns which made management by government a necessity. The principal productive feature of the coastal zone is the estuary with its associated beaches and marshlands. Estuaries have been divided into four types: the drowned river valley such as Chesapeake Bay; the fjord type which consists of deep coastal indentures gouged out by glaciers such as occur in Norway, British Columbia, and Alaska; the bar-built estuary, characterized by shallow basins enclosed by a chain of barrier islands such as those found along the coast of North Carolina; and estuaries produced by tectonic processes--coastal indentures produced by geological faulting, such as San Francisco Bay. The river delta, such as the mouths of the Mississippi or the Nile Rivers, is another type of estuary. Salt marshes are integral parts of estuaries, and are now considered to be the most highly productive areas on earth. About 90% of the total harvest taken by commercial fishermen in the United States is dependent on the estuaries; and salt marshes are essential to coastal fisheries. These include shrimp, flounder, menhaden, bluefish, anchovies, and striped bass. Many species of birds and mammals also depend on the estuaries. Estuaries protect the land against ocean erosion, and salt marshes hold sediment that otherwise would be deposited in harbors and navigation channels. Legal and institutional changes are needed to protect estuarine resources. Important public

9.3 (9.4)(9.11) AGREEMENTS SIGNED DURING GENERAL SECRETARY BREZHNEV'S VISIT TO THE UNITED STATES

Anonymous
Department of State Bulletin 69, No. 1778, 158-175 (July 23, 1973)

One of the agreements signed during the week of June 18, 1973 by President Nixon and General Secretary Brezhnev, and other officials was the "agreement between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics on Cooperation in Studies of the World Ocean." Extracts of some and of parts of the articles of agreement are as follows:

The Parties will develop and carry out cooperation in studies of the World Ocean on the basis of equality, reciprocity and mutual benefit.

In their studies of the World Ocean, the Parties will direct cooperative efforts to the investigation and solution of important basic and applied research problems.

a. Large-scale ocean-atmosphere interaction, including laboratory studies, oceanic experiments, and mathematical modeling of the ocean-atmosphere system.

b. Ocean currents of planetary scale and other questions of ocean dynamics.

c. Geochemistry and marine chemistry of the World Ocean.

d. Geological and geophysical investigations of the World Ocean, including deep sea drilling for scientific purposes.

9.3 UNITED STATES OCEANS POLITICS

Hollick, Ann L. (School of Advanced International Studies, Johns Hopkins University, Washington, D.C.)
San Diego Law Review 10, No. 3, 467-501 (May 1973)

Various agencies of the U.S. Government have been actively engaged since 1967 in formulating policy relating to the control and use of the oceans involving the various issues of exploitation of the seabed, the breadth of the territorial sea, transit rights through straits, and the conservation and allocation of fishery resources. These issues concern a complex array of national and commercial interests in the United States and abroad including interactions of interests and prespectives within the U.S. Government. This paper deals with the political activities behind the formulation of U.S. oceans policy.

[2 tables, 44 footnotes] FTP

9.3 (9.4)(9.11)

Cooperation provided for in the preceding Articles may take the following forms:

a. Joint planning, development, and implementation of research projects and programs;

b. Exchange of scientists, specialists, and advanced students;

c. Exchange of scientific and technical information, documentation, and experience, including the results of national oceanographic studies;

d. Convening of joint conferences, meetings, and seminars of specialists;

e. Appropriate participation by both countries in multilateral cooperative activities sponsored by international scientific organizations;

f. Facilitation by both Parties, in accordance with laws, rules and regulations of each country and relevant bilateral agreements, of use of appropriate port facilities of the two countries for ships' services and supplies, including provision for rest and changes of ships' personnel, in connection with carrying out cooperative activities.

For implementation of this Agreement, there shall be established a US-USSR Joint Committee on Cooperation in World Ocean Studies.

Extracted in part

9.3 LAW OF THE SEA: EFFECTS OF VARYING COASTAL STATE CONTROLS ON MARINE RESEARCH. A SURVEY OF THE U.S. OCEAN SCIENCE COMMUNITY

Cheek, Conrad H. (Chemical Oceanography Branch, Ocean Sciences Division, Naval Research Laboratory, Washington, D.C.)
Ocean Development and International Law Journal 1, No. 2, 209-219 (Summer 1973)

This paper contains excerpts from a U.S. Government survey report distributed to selected members of the U.S. ocean science community in Dec. 1972. The excerpts include the summary of the study, the introduction, brief reference to results and discussion, and material on the item "Attitudes Toward Coastal State Requirements." The original survey was conducted to obtain information for use in evaluating how various postulated coastal State controls over scientific research could affect U.S. ocean scientists and their research programs. The distribution of the research at sea ran about 50% on and above the continental shelf, 30% beyond the continental shelf but landward of 200 nautical miles, and 20% beyond 200 nautical miles from land. There appeared to be a large but declining interest in the Caribbean, Mexican, and Canadian waters, and increasing interest in more remote waters, particularly those off the southern continents. Some interesting results of the survey are profiles of the attitudes of marine scientists toward several types of requirements and restrictions that coastal States impose as requisites to the granting of clearances. Apparently, U.S. scientists undertaking open marine research would probably not object to a coastal State's desire for participation and training of its personnel and for ensuring that research conducted in waters under its jurisdiction conforms to stated intentions. They would, however, be concerned over requirements that involve jurisdiction over raw data and/or samples, publication rights, substantial additional time and/or expense, and substantial modification of research plans.

FTP

9.2 PRICE SPREADS OF FISH PRODUCTS AMONG PRODUCERS AND DISTRIBUTORS

Penn, Erwin S. (Economic Research Division, National Marine Fisheries Service, Washington, DC 20235)
Marine Fisheries Review 35, No. 7, 1-9 (July 1973)

To find the cause of the difference between the price the fisherman receives for his product and the ultimate price paid by the consumer, this report provides an analysis of how the consumer's dollar is distributed to four marketing levels: fisherman, processor, wholesaler, and retailer. The difference or margin between selling and purchasing prices of each level and the share of the consumer's dollar by each level and each cost component are calculated for 14 fish products. The report also analyzes the costs and profits incurred by each marketing function and describes the major influences on margin differences. The purpose of the study is to provide a systematic guide that individual firms in the fishery can use to examine their margins, costs, and profits for each fish product, and compare them with the figures presented in this study as national averages for the same product.

Over half of the margin at the harvesting level is labor cost. Wage rates have been increasing faster than most costs, and this trend is likely to continue. The slow recruitment of resources of certain species and the lag in harvesting efficiency in some fisheries will further accelerate the increase in ex-vessel prices or fishermen's margin compared to other levels.

When price spreads of different periods are compared, the year-to-year changes are ascribed to one or more of the following seven factors: (1) demand and supply, (2) cost of production factors, (3) different profits made by producers and dealers, (4) degree of processing and extent of services, (5) quantity of imports, (6) revaluation of currency, and (7) efficiency of the marketing system.

[4 figures, 6 tables, 5 references]

Extracted

9.3

rights are derived from state ownership of the lands and waters of the coastal zone, and under state law, several legal doctrines may provide a basis for public rights in privately owned land. Using North Carolina as an example, the author states that much of the land in the coastal zone is state or federal property. These lands can be administered with a view toward protecting the resources of the area in the public interest. No rights of public use can be created for privately held land without compensation, but regulations and restrictions can be adopted to prevent undesirable development. New coastal zone legislation should take into account the substantial rights possessed by the public under traditional legal principles. In addition, a coastal zone agency should be created to manage the area to ensure proper environmental development. The agency should have a planning function as well as regulatory duties. In this way, order can be brought to the decisionmaking processes that affect the coastal zone. A bill to be voted upon by the people of North Carolina regarding coastal zone management is included in an appendix to the article.

[206 footnotes]

SW

9.3 TREATY PROVISIONS CONCERNING MARINE SCIENCE RESEARCH

Burger, W. (Sand Point Oceanic Center, in Washington State)
Ocean Development and International Law Journal 1, No. 2, 159-184 (Summer 1973)

Most likely future law of the sea negotiations will consider specific treaty arrangements dealing with conduct of scientific research at sea. In this paper, the author discusses some general policies relevant to consideration of such treaty provisions and some particular issues involving area, vessel, and object coverage, the nature of rights and obligations, a proposed basic principle of noninterference, definition of research, and access to the various ocean regions subject to varying degrees of coastal authority and those beyond. The appendix is a Draft Treaty on Marine Science Research.
[18 footnotes] FTP

9.3 WIDE LIMITS AND "EQUITABLE" DISTRIBUTION OF SEABED RESOURCES

Anonymous
Ocean Development and International Law Journal 1, No. 2, 137-158 (Summer 1973)

The author discusses some of the drawbacks of a universally applied 200-mile limit for seabed resources. These drawbacks include: (1) The 200-mile limit has no significance; it is purely artificial and has little basis in nature, (2) adoption of a 200-mile limit universally might jeopardize the usefulness of establishing an international regime for deep seabed resources, and (3) opposition to the 200-mile limit by landlocked and shelf-locked countries from the standpoint of resource distribution. A systems approach is suggested that would maximize the objectives of existing international conventions, help promote the rational development of deep seabed resources, and help provide for equitable distribution of resources with provision for acceptable benefits to all major groups of countries. One solution that was proposed was to have the limit of coastal jurisdiction over seabed resources be defined in terms of the continental margin in conjunction with a scheme of progressive revenue sharing according to the distance from the coast, water depth, and the economic level of each country.
[1 figure, 4 tables, 31 references] FTP

9.3 DRAINED WEIGHT DETERMINATION OF FROZEN GLAZED SNOW CRABMEAT
(1.86)

Miller, George A. (Food and Drug Administration, 909 First Ave., Seattle, WA 98104)
Journal of the Association of Official Analytical Chemists 56, No. 4, 886-887 (July 1973)

The snow crab currently accounts for a large proportion of the crab supply due to the scarcity of the Alaskan king crab. The product obtained from snow crab is marketed in the form of frozen glazed crabmeat. Tests were performed to evaluate the applicability of the methods for determining drained weight of Alaskan king crabmeat to snow crabmeat. A collaborative study was conducted on the official final action drained weight methods using Code of Federal Regulations (1972) Title 21, Sec. 3.34, method 18.006-18.007 and the Alaska King Crab Market and Control Board method 18.008-18.009 using snow crabmeat. Four packs analyzed by method 18.006-18.007 yielded an average recovery of 76% of put-in tissue weight; two packs analyzed by method 18.008-18.009 yielded an average recovery of 83% of put-in tissue weight. Both methods have been amended to include snow crabmeat.
[1 table, 5 references] SW

9.6 EUROPEAN INLAND WATER FISH. A MULTILINGUAL CATALOGUE
(9.12)

Blanc, M., P. Banarescu, J.-L. Gaudet, and J.-C. Hureau (editors) (European Inland Fisheries Advisory Commission)
Food and Agriculture Organization of the United Nations, Rome, Italy (1971), xix + 131 pp. Published by Fishing News (Books) Ltd., 110 Fleet St., London, EC4A 2JL, England. Price $22.00; £8.75.

This book provides a complete list of the fish in the inland waters of Europe with their Latin names and names in the language of the country where they are found. The explanation of how to use the catalog are given in English, French, Spanish, and German. Line drawings are used to identify the fish, and colored plates illustrate the appearance of typical species of the main families. In addition, there is a geographic chart to show the distribution of each species. Other information given for each species includes the official vernacular name in the country where it is found and scales and length data. A chart classifies the species in accordance with family, order, and class for quick reference.
[418 illustrations] SW

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

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0.33 SYMPOSIUM: PROTEIN INTERACTIONS IN BIOSYSTEMS
PROTEIN-LIPID INTERACTIONS

Karel, M. (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Food Science 38, No. 5, 756-763 (July-Aug. 1973)

Interactions between proteins and lipids are involved in important processes in food and biological systems. This article is a review of current information on the mechanism of lipid-protein interactions and the status of research on the interactions between oxidizing lipids and proteins.

In most isolated, natural, lipid-protein complexes, phospholipids are contained in the lipid fraction. Electrostatic forces may be involved in phospholipid binding to proteins. Another mode of binding is the formation of salt bridges through divalent metals such as calcium. These two forms of binding may occur simultaneously and cooperatively. Hydrophobic bonding may occur in lipid-protein complexes when nonpolar groups interact in aqueous media. The author discusses the changing concepts of biological membrane structure. The phospholipid leaflet or bilayer was the earliest accepted model of cell membrane structure. From it came the unit membrane concept which proposed that the phospholipid polar groups in the bilayer were bound by polar interactions to proteins of extended chain configuration. Later studies on membranes yielded new information that changed the lamellar concept to a globular form of membrane. The globular membrane consists of repeating lipoprotein units, one layer thick. This concept was modified to a double layer of globular protein subunits with phospholipid located between the subunits.

0.35 (4.13) NON-METHYLENE-INTERRUPTED FATTY ACIDS IN LIPIDS OF SHALLOW-WATER MARINE INVERTEBRATES: A COMPARISON OF TWO MOLLUSCS (LITTORINA LITTOREA AND LUNATIA TRISERIATA) WITH THE SAND SHRIMP (CRANGON SEPTEMSPINOSUS)

Ackman, R. G., and S. N. Hooper (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Comparative Biochemistry and Physiology 46, No. 1B, 153-165 (Sept. 15, 1973)

Open-tubular gas-lipid chromatography was used to examine the fatty acids from the total lipids and certain lipid fractions of the periwinkle (L. littorea), moon snail, and the sand shrimp. Two sets of novel fatty acids were found; they seem to have nonmethylene-interrupted structures in which two of three eicosadienoic acids each have one ethylenic bond in the Δ^5 position and the others in positions mimicking the corresponding normal monoethylenic fatty acids, while in two docosadienoic acids the first ethylenic bond may be in the Δ^7 position. These novel fatty acids did not appear to be components of the lipids of the sand shrimp; however, sand shrimp lipids shared with the mollusks emphasis on chain extension of 9-hexadecenoic acid to 13-eicosenoic acid.
[2 figures, 3 tables, 37 references] FTP

0.35 THE BIOSYNTHESIS OF ASTAXANTHIN--XIV. THE CONVERSION OF LABELLED β-CAROTENE-15,15′-$^3H_2$ INTO ASTAXANTHIN IN THE CRAB, PORTUNUS TRITUBERCULATUS

Katayama, Teruhisa, Yoko Kunisaki, and Makoto Shimaya (Laboratory of Marine Biochemistry, Faculty of Fisheries, University of Kagoshima, 470, Shimoarata, Kagoshima, Japan), K. L. Simpson, and C. O. Chichester (Dept. of Food and Resource Chemistry, University of Rhode Island, Kingston, RI 02881)
Comparative Biochemistry and Physiology 46, No. 2B, 269-272 (Oct. 15, 1973)

In an earlier report, the senior author and his coworkers showed that canthaxanthin, 4-hydroxyechinenone, 3-hydroxycanthaxanthin, and astaxanthin and β-carotene, echinenone, isocryptoxanthin, and astaxanthin could be isolated from the carapace and internal organs, respectively, of the crab. However, because these crabs were from a natural habitat, it was not possible to determine the origin of the various pigments with certainty. In the present study, the researchers attempted to determine the metabolic pathway of the pigment by the use of labeled β-carotene-15,15′-$^3H_2$ in the diet of the crabs. The crabs were cultured in the laboratory for over a month by feeding them a special diet without added β-carotene in order to condition them to the particular diet. Then the crabs were fed for 2 weeks the special diet containing β-carotene-15,15′-$^3H_2$ dissolved in soybean oil. At the end of this 2-week period, the internal organs and the carapace of the crabs were analyzed separately for the various pigments. The results indicate that β-carotene-15,15′-$^3H_2$ was converted to labeled astaxanthin through the steps of isocryptoxanthin, echinenone, canthaxanthin, and 3-hydroxycanthaxanthin.

0.38 (9.6) PRINCIPLES OF ENZYMOLOGY FOR THE FOOD SCIENCES

Whitaker, John R.
Marcel Dekker Inc., New York (1972), v + 636 pp. $26.50.
C. L. Walters (reviewer)
Journal of Food Technology 8, No. 1, 116-117 (Mar. 1973)

The introduction of this treatise contains a long list of the established and suggested functions of enzymes during the processing of foodstuffs. It also discusses the theoretical aspects of enzyme action and covers such topics as the techniques for enzyme purification and the effects of enzyme catalyzed reactions of such factors as substrate concentration, enzyme concentration, pH, temperature, and the actions of enzyme inhibitors. The second part of the book may be of more interest to food scientists who are concerned with the use of endogenous or exogenous enzymes during food processing or with the control of deleterious changes caused by these enzymes. The various chapters in this part deal with glycosidic hydrolases, pectic enzymes, esterases, enzymes involved in degradation of nucleic acids, proteolytic enzymes, and oxido-reductases, including lactate dehydrogenase, glucose oxidase, polyphenol oxidase, xanthine oxidase, catalase, peroxidase, and lipoxidase. For each type of biological catalysis, the specificity and mechanism of action are discussed. The book is well indexed and it should be useful to the food scientist to make full use of the potentialities of enzymes in providing products of the caliber demanded by modern technology. FTP

0.35

On the basis of these results and those of previously published studies, the authors classified aquatic animals into three classes based upon their biosynthesis of astaxanthin as follows:

1. Red carp--form. These species can convert lutein or zeaxanthin to astaxanthin; β-carotene is not the major precursor of astaxanthin. These fish can transfer the astaxanthin from their diet to body astaxanthin.

2. Sea bream--form. These species can convert β-carotene, lutein, or zeaxanthin to astaxanthin, and also transfer the astaxanthin in their diet to body astaxanthin.

3. Prawn--form. These species can convert β-carotene to their body astaxanthin. Almost all the crustacea that contain astaxanthin in their body belong to this group. This group has two subclasses. One subclass (includes the prawns Penaeus japonicus and Metapenaeopsis barbata) can convert β-carotene to astaxanthin in the internal organs. The other subclass (includes the lobster Panulirus japonicus and the crab P. trituberculatus) can convert β-carotene to astaxanthin, but they can also, in their internal organs, convert β-carotene to its intermediates, and these intermediates can be metabolized to astaxanthin in the cells of other parts of the animal.

[1 table, 17 references]

FTP

0.4 RAPID NITROSATION OF PHENOLS AND ITS IMPLICATION FOR HEALTH HAZARDS FROM DIETARY NITRITES

Challis, B. C. (Dept. of Organic Chemistry, Imperial College, London SW72 AY, England)
Nature 244, No. 5416, 466 (Aug. 17, 1973)

The presence of sodium nitrite in food as a preservative may result in the formation of secondary N-nitrosamines, which are carcinogenic to laboratory animals. Nitrosamines may form in the food itself during processing or in the digestive tract by combination of nitrite with secondary amines. Only minute amounts of N-nitrosamines have been detected in preserved food so far. There is less information about the carcinogenicity of nitrosophenolic compounds than for nitrosamines, but there is clear evidence that the nitrosation of phenolic compounds is much faster than nitrosation of most secondary amines. Phenols in the digestive tract, other reports indicate, readily undergo nitrosation by a pH independent pathway from pH 1 to 5. The reaction should be more rapid with polyhydroxylated and polycyclic aromatic compounds, such as catechol and 2-naphthol, respectively. The dietary intake of phenolic compounds (in plant and animal foods) is more than that of secondary amines. Gastric juice also contains phenolic materials. The author suggests that nitrosophenols are more likely to be produced than N-nitrosamines through the use of nitrites as food preservatives. Furthermore, if nitrosophenols formed in the digestive tract prove harmless, then the phenolic compounds present in the diet and gastric juice may combine with the nitrite salts before they can react with secondary amines or other nitrogenous material present from which N-nitrosamines may form.

[1 table, 12 references]

SW

0.33

In the current membrane model, reported by Singer and Nicolson [Science 175, 720 (1972)], the phospholipid bilayer forms a continuing membrane. Within the bilayer, various protein forms exist as globular, alpha-helix containing units, or in extended chains (beta configuration). These forms of protein may interact with the lipids by polar or hydrophobic bonding. This model allows protein-lipid complexes to form either hydrophilic or hydrophobic "gates" allowing transport across the membrane.

Lipid protein interactions are important in the properties of foods. Lipid protein complexes are involved in the aging of meat and the changes occurring in frozen meat and fish. The stability of some food emulsions may depend on lipoproteins which are potentially able to form strong films around oil droplets. Some lipoproteins, such as in egg and milk, seem to promote foams. Lipid protein interactions occur in the processing of milk products such as in the manufacture of cream, ice cream, and butter. Other interactions in lipid protein complexes described by the author include those in wheat flour, dough, and bread, and in textured food preparations. Another reaction that is being investigated is the peroxidation of lipids in lipid protein systems. Peroxidized lipids may react with proteins forming toxic or biologically active compounds in foods. In vivo lipid peroxidation may be involved in disease processes.

[13 figures, 50 references]

SW

0.35 LUMISOMES, THE CELLULAR SITE OF BIOLUMINESCENCE IN COELENTERATES

Anderson, James M., and Milton J. Cormier (Dept. of Biochemistry, University of Georgia, Athens, GA 30601)
Journal of Biological Chemistry 248, No. 8, 2937-2943 (Apr. 25, 1973)

A membrane-enclosed subcellular particle that was responsible for bioluminescence was isolated from 10 species of bioluminescent coelenterates. The animals studied were species of Obelia and Clytia from class Hydrozoa and species of Renilla, Ptilosarcus, Stylatula, Acanthoptilum, and Parazoanthus from class Anthozoa. The purified particle preparations appeared homogeneous in size and shape when examined by electron microscopy; they had a diameter of about 0.2 μm and were enclosed by a unit membrane. The particles had all the proteins necessary to produce the typical green bioluminescence noted in vivo in these animals. These include the calcium-triggered photoprotein luciferase and a green fluorescent protein. The particles show bioluminescence when they are placed in hypotonic solutions of calcium ion; oxygen is also required. The authors suggest that the widespread occurrence of the bioluminescent particles in the coelenterates indicates that they represent the cellular site of bioluminescence in these animals. They propose that these particles or organelles be called lumisomes.

[8 figures, 3 tables, 26 references]

FTP

.5 (7.86) A BACTERIOLOGICAL PRESSURE-RETAINING DEEP-SEA SAMPLER AND CULTURE VESSEL

Jannasch, H. W., C. O. Wirsen, and C. L. Winget (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Deep-Sea Research 20, No. 7, 661-664 (July 1973)

In order to overcome the decompression problem in deep-sea bacteriological sampling, the authors designed and constructed an instrument that could be used as a sampler and pressurized culture vessel. The device collects a 1-liter sample; the sample does not undergo a change of pressure during filling of the vessel, nor during retrieval to the surface and prolonged periods of incubation in the laboratory. Subsamples of 13 ml may be taken without affecting the pressure within the vessel. The instrument has provision for easy pressure adjustment and internal mixing.
[3 figures, 7 references] FTP

0.6 (0.5) INHIBITION OF STAPHYLOCOCCAL ENTEROTOXIN PRODUCTION IN CONVENIENCE FOODS

Heidelbauer, R. J., and R. R. Middaugh (Dept. of Bacteriology, South Dakota State University, Brookings, SD 57006)
Journal of Food Science 38, No. 5, 885-888 (July-Aug. 1973)

The food industry needs information on environmental conditions which will prevent the production of staphylococcal enterotoxin during food processing, packaging, and storage. An investigation by the authors generated data showing the effects of combinations of environmental conditions on enterotoxin B production in slurries of cheese, ham, and shrimp. The environmental conditions tested included temperature, initial pH, NaCl concentration, and atmospheres of CO_2, N_2, and air. The method of detection of enterotoxin producing Staphylococcus aureus was the fluorescent antibody technique (FAT) developed by R. L. Stark and P. R. Middaugh [Appl. Microbiol. 18, 631 (1970)]. The FAT technique was found to be reliable in the rapid detection of enterotoxin B except in food slurries held under atmospheres of high CO_2 or N_2 concentrations.

Enterotoxin production in cheese slurry was found to be inhibited by the following conditions: temperature of 44° C combined with initial pH below 7; and the combination of a temperature of 37° C, pH 7, and NaCl concentration of 6% and above. In shrimp slurry, enterotoxin production was inhibited by a pH of 7 or less and by 8% NaCl concentrations at a temperature of 37° C. Concentrations of NaCl above 6% at 37° C and pH values below 9 inhibited enterotoxin production in ham slurry. An atmosphere of CO_2 inhibited cell fluorescence without affecting enterotoxin production or detection by the gel diffusion method [Public Health Rep 78, 1089 (1963)].

0.6 CHEMISTRY AND TECHNOLOGY OF PACIFIC FISH

Kizevetter, I. V. (editor) (Pacific Scientific Research Institute of Marine Fisheries and Oceanography (TINRO, Leninskaya 20, Vladivostok, U.S.S.R.)
Translated from the Russian (1973), 304 pp. Available from the U.S. Dept. of Commerce, National Technical Information Service, Springfield, VA 22151. Order No. TT72-50019. Price not given.

The far eastern fish canneries and processing plants of the U.S.S.R. use various raw materials that differ in technological characteristics and chemical composition. In the search for the most profitable process procedures and to establish a good assortment of products, it was necessary to determine the mechanical, physical, and chemical characteristics of the raw material. The fishery activities of the U.S.S.R. in the Pacific Ocean are dependent on many species of fish, crustaceans, mollusks, mammals, and marine plants. Chemical analyses of tissues and other substances were carried out on samples from these species. The findings were used to develop effective procedures for utilizing this raw material, and the information was arranged in this book under the zoological classification assigned to the organisms that are found in the fisheries. The subclass Cyclostomata is the first category treated in this manner, and the sea lamprey comprises part of the catches. The information provided on these fishes includes length and weight, plus moisture, fat, protein, and ash content relative to season and place of capture. Various tissues of the body have also been analyzed. Also included is the vitamin content of flesh, liver, skin, and gonads. The chemical composition of canned,

0.6 STUDIES ON THE USE OF CALCIUM CARBONATE IN THE FEEDING OF LAYING HENS DURING SUMMER MONTHS

Tortuero, Francisco, and Carmen Centeno (Instituto de Alimentación y Productividad Animal, C.S.I.C., Ciudad Universitaria, Madrid-3, Spain)
Poultry Science 52, No. 3, 866-872 (May 1973)

These feeding studies with laying hens were carried out to determine the influence of different levels of calcium carbonate on production indexes and shell quality at temperatures above 30° C. The calcium carbonate was ground and incorporated into the diet of the hens or was used as supplemental granules. Also, the effects of dietary calcium levels or supplementation on the calcium and nitrogen retention and on the digestibility of fat and crude fiber were determined. The calcium carbonate was provided through the use of a fossiliferous calcareous rock containing 99.7% calcium carbonate (39.9% Ca) and free of magnesium.

Ten-month-old commercial egg-type hens were used. The feeding test lasted 3 months. The various diets were isocaloric and isonitrogenous, but varied only in the level of calcium. The dietary calcium levels were 2.68%, 3.86%, and 4.18%. One part of each of the groups fed 2.68% and 3.86% dietary levels of calcium was also given daily supplements of calcium carbonate granules equivalent to 1.14 g of calcium per bird per day. Evaluations were made of egg production and egg quality, and on calcium and nitrogen retention and digestibility of the fat and crude fiber.

The results indicated that, when the environmental temperature rose above 30° C, levels of calcium of more than 2.68% of the diet (or as the addition of supplemental granules) were needed for optimum egg production of the hens and for optimum

0.6

baked, and smoked sea lamprey is given. The Elasmobranchii, of the class Chondrichthyes (sharks and skates), are treated in a similar manner. The largest portion of the book is devoted to the superorder Teleostei (or subclass Neopterygii) under which the well-known fish families are classified: Clupeidae (herring, sardine), Engraulidae (anchovies), Salmonidae (salmons), Coregonidae (whitefish), Osmeridae (smelts), Cyprinidae (carp), Gadidae (cod), Scombridae (mackerel and tuna), and Pleuronectidae (flounders). Tables and graphs showing composition accompany the text, and an extensive bibliography, from Russian and other language sources, is provided.

SW

0.6

eggshell quality. The weight of the eggs did not increase with the increasing calcium levels fed the hens. Feed consumption was less with the increasing level of calcium fed. Calcium retention increased at the lower levels of calcium in the diet. It appears that 2.0 g of utilizable calcium per bird per day is optimal.

When calcium carbonate in the form of granules was fed to the hens, the values for nitrogen retention and for fat and crude fiber digestibility increased; probably the presence of these granules in the gizzard or intestine of the birds facilitated digestion.

[4 tables, 22 references]

FTP

0.6 SODIUM AND CHLORIDE REQUIREMENTS OF THE CHICK: RELATIONSHIP TO ACID-BASE BALANCE

Hurwitz, S., I. Cohen, A. Bar, and S. Bornstein (Institute of Animal Science, Agricultural Research Organization, Volcani Center, Bet Dagan, Israel)
Poultry Science 52, No. 3, 903-909 (May 1973)

The researchers examined the sodium and chloride requirements of broiler-chicks in view of the interaction between these ionic components of the diet in the acid-base balance of the body. They found that with increasing levels of an optimal sodium-chloride mixture in the diet of the chick, body weight gain increased linearly to reach a peak with a diet containing 0.13% sodium and 0.13% chloride.

[2 figures, 1 table, 12 references]

FTP

0.6

baked, and smoked sea lamprey is given. The Elasmobranchii, of the class Chondrichthyes (sharks and skates), are treated in a similar manner. The largest portion of the book is devoted to the superorder Teleostei (or subclass Neopterygii) under which the well-known fish families are classified: Clupeidae (herring, sardine), Engraulidae (anchovies), Salmonidae (salmons), Coregonidae (whitefish), Osmeridae (smelts), Cyprinidae (carp), Gadidae (cod), Scombridae (mackerel and tuna), and Pleuronectidae (flounders). Tables and graphs showing composition accompany the text, and an extensive bibliography, from Russian and other language sources, is provided.

SW

0.119 A CAGE DESIGNED FOR METABOLISM- AND NITROGEN BALANCE (7.9) (0.7) TRIALS WITH MINK

Jørgensen, G., and N. Glem Hansen (National Research Institute of Animal Nutrition, Experimental Fur-Farm, Hillerød, Denmark)
Acta Agriculturae Scandinavica 23, 3-4 (1973)

The cages used for normal production of mink are not suitable for use in metabolism and nitrogen balance studies. This article gives the details for the construction of a cage for such studies with mink.

[3 figures, 2 references]

FTP

0.6 THE ESSENTIAL NATURE OF GLYCINE AND PROLINE FOR GROWING CHICKENS

Graber, George, and David H. Baker (Dept. of Animal Science, University of Illinois, Urbana, IL 61801)
Poultry Science 52, No. 3, 892-896 (May 1973)

The chick requires a dietary source of 12 amino acids for maximal weight gain and gain/feed ratio. Only proline and glycine-serine are synthesized in vivo. Most of the data showing a dietary need for glycine and proline were obtained from studies using the young chick over a fairly short assay period. In the present study, four assays were carried out to determine the influence of age, length of feeding period, and prior dietary regimen on the essentiality of glycine and proline for growing chickens.

A complete purified diet was used. The loss of nitrogen resulting from deletion of glycine and/or proline was replaced by glutamic acid. Cornstarch was added to the diet at levels required to maintain the ingredient total at 100%. Feed and water were available ad libitum to the chickens. The feeding test period was 8 weeks posthatching.

Both glycine (in the absence of dietary serine) and proline were essential for maximal performance of the chickens at all stages of life from hatching to 8 weeks posthatching. Apparently, the growing chicken can synthesize about 90% of its proline needs and about 60% to 70% of its glycine needs for maximal growth.

[4 tables, 22 references]

FTP

0.6 (0.5)

An N_2 atmosphere inhibited cell fluorescence when combined with NaCl concentrations of 6% and above. An N_2 concentration above 50% in the atmosphere inhibited enterotoxin detection by the gel diffusion method. Nitrogen levels of 25%, 50%, and 100% in the atmosphere combined with 6% NaCl concentrations, inhibited production of enterotoxin.

These results can aid investigators of food poisoning cases to predict the combinations of conditions that promoted toxin production. In addition, the data can assist food processors in setting conditions that will prevent toxin production.

[6 tables, 8 references]

SW

0.38 ENZYMES INVOLVED IN THE LAST STEPS OF THE BIOSYNTHESIS (6.31) OF MANNITOL IN BROWN ALGAE

Ikawa, Tomoyoshi, Tsuneo Watanabe, and Kazutosi Nisizawa (Fac. Sci., Kyoiku, Univ., Tokyo, Japan)
Chemical Abstracts 78, No. 17, 107544u (Apr. 30, 1973)

0.7
(2.3)

EFFECTS OF COOKING AND RINSING ON THE PROTEIN LOSSES FROM BLUE CRABS

Hanover, L. M., N. B. Webb, A. J. Howell, and F. B. Thomas (Dept. of Food Science, North Carolina State University, Raleigh, NC 27607)
Journal of Milk and Food Technology 36, No. 8, 409-413 (Aug. 1973)

The liquid produced during the processing of blue crabs is discharged as waste material. Liquids lost during processing are considered to be exudates rather than drip loss which is associated with freezing and thawing. The liquids lost from blue crab processing can result from washing, rinsing, cooking, meat extraction, and sometimes cooling processes. The authors suggest that these lost liquids contain significant amounts of protein. Studies were performed to determine the amount of protein in the lost liquids and the effect of controlled rinsing and dipping operations on the amount of protein lost.

Crabs were steamed at either 100° or 121° C under pressure. The higher temperature resulted in a greater amount of cook loss fluids than those from steaming at the lower temperature. Analysis of the fluids resulting from steaming at 121° C showed that the protein content was higher than fluids resulting from steaming at 100° C. Rinsing samples of steamed crab meat with tap water resulted in protein losses of 15.2% in the 100° C process meat and 12.6% in the 121° C process meat. Dipping crabmeat samples steamed at 100° C in salt brine solution resulted in a protein loss of 11.2%; crab meat steamed at 121° C and treated similarly resulted in a loss of 7.3%.

[1 figure, 4 tables, 13 references] SW

0.7

EFFECT OF FEEDING RESTRICTED AMOUNTS OF A MEDIUM AND A HIGH PROTEIN DIET DURING THE FINISHING PERIOD ON GROWTH, FAT DEPOSITION AND FEED EFFICIENCY OF MALE AND FEMALE BROILERS

Auckland, John N., and Robert B. Fulton (Loughry College of Agriculture and Food Technology, Cookstown, Co. Tyrone, North Ireland)
Journal of the Science of Food and Agriculture 24, No. 6, 709-717 (June 1973)

For profitable production of meat, animals should reach market weight in the shortest possible time (to minimize maintenance time and to maximize the fraction of the food consumed that is used for growth). In this study, a feeding test with broilers was carried out to examine the effects of feeding restricted amounts of a medium-protein and a high-protein diet on growth, feed efficiency, and body composition. Male and female broilers in separate groups were fed either a 20% (medium protein) or a 23% (high protein) diet, at four levels of intake (ad libitum and about 96%, 92%, and 87% of the ad libitum rate) from 35 to 56 or 60 days of age. All the groups received the same commercial starter diet from day 1 to 35 days of age. In order to allow comparison of food conversion and body composition on an equal body weight basis, the broilers on the most severely restricted diet groups were continued on treatment up to 60 days of age when it was estimated that their live weights would have reached the weight level attained by corresponding groups fed ad libitum for 56 days.

The male broilers ate more and grew faster and showed a better feed conversion than the female birds. At market age, the male bird carcasses were significantly leaner than the female carcasses.

0.7

EFFECT OF FEEDING RESTRICTED AMOUNTS OF A MEDIUM- AND HIGH-PROTEIN DIET ON GROWTH AND BODY COMPOSITION OF DUCKLINGS

Auckland, John N. (Loughry College of Agriculture and Food Technology, Cookstown, North Ireland)
Journal of the Science of Food and Agriculture 24, No. 6, 719-726 (June 1973)

Carcasses of ducklings usually contain much more fat than do carcasses of chickens or turkeys of comparable age or body weight. For example, 7.5-week-old ducklings showed about 65% fat in their carcass dry matter, whereas 7-week-old turkeys showed about 12% fat in their carcass dry matter and 20-week-old turkeys showed about 25% fat in their carcass dry matter. In the present study, the researcher examined the effects of feeding restricted versus unrestricted amounts of a medium- and of a high-protein diet on growth, feed efficiency, and chemical composition of young ducklings. Two hundred and sixteen ducklings (both sexes) were fed diets containing either 19.5% or 24.7% crude protein, either to appetite or to 85% of appetite, from age day 1 to age 21 or 24 days.

No significant interactions were found between dietary protein level and level of feeding for body weight, food intake, or food conversion ratios at 21 days of age. At 21 days of age, the ducklings fed the 24.7% protein diet were 28% heavier than those fed the 19.5% protein diet, and the ducklings fed the higher level of intake (to appetite) were 17% heavier than those on the restricted level of intake (85%). At 24 days of age the body weight of the ducklings on the restricted level of intake was about the same as that of those fed the higher level

0.7
(0.32)(9.6)

PROTEINS IN HUMAN NUTRITION

Porter, J. W. G., and B. A. Rolls (editors) (National Institute for Research in Dairying, Shinfield, Reading, England)
Academic Press, 111 Fifth Ave., New York, NY 10003 (Mar. 1973), xii + 562 pp. £9.50 (ca $30.00).

This book contains a series of reports from a NATO Advanced Study Institute on the Chemistry, Biology, and Physics of Protein Evaluation held in Reading, England, in March 1972. It is divided into four sections. The first section (7 papers) considers world protein supplies and requirements. The second (16 papers) deals in detail with the techniques for the assessment of the nutritive value of protein. The third (7 papers) deals with the role of the food scientist in the development and use of various protein isolates. The final section (6 papers) considers some of the factors (digestion of proteins, amino-acid supplementation, toxic factors, etc.) that affect the utilization of protein. FTP

0.7

of intake at 21 days of age. From age 1 to 21 days, feed efficiency for the ducks fed the high-protein diet was better than that for the birds fed the medium-protein diet; the feed efficiency was similar for the two levels of food intake. Food efficiency for the ducklings on the restricted intake level during the 1- to 24-day period was slightly worse than that of those birds of similar body weight fed the higher level of intake for from 1 to 21 days.

At 21 days of age, the carcasses of the ducklings fed 24.7% protein contained 31% dry matter, of which 34% was fat and 53% was protein, and the carcasses of the birds fed 19.5% protein contained 34% dry matter, of which 41% was fat and 48% was protein. The reduction in body fat due to dietary protein level was about twice the magnitude of the reduction in body fat due to the about 16% reduction in feed intake. Feeding the ducklings the higher protein diet reduced body fat and at the same time promoted a significantly faster gain in live weight; moderate feed restriction resulted in smaller and only slightly leaner birds. Apparently, feeding ducklings excess protein may offer more scope than quantitative restriction in feed in reducing their body fat.

[3 tables, 7 references] FTP

1.0119 [OUR MOST IMPORTANT FISHING RESOURCE]
(1.87) NUESTRO RECURSO PESQUERO MÁS IMPORTANTE

Prepared by Cent. Invest. Pesq., Havana, Cuba
Mar. Pesca. 80, 12-19 (1972) (In Spanish)
Aquatic Sciences & Fisheries Abstracts 3, No. 6, 228, Abstract No. 3Q6710M (June 1973)

Cuban lobster fishing goes back 60 years. The catch in the 1930's was about 546 metric tons annually; in 1969, the catch rose to 11,131 tons. Most of the catch is frozen and canned at eight plants. The lobster fleet consists of many sizes of vessels of various ages, and lobsters are fished as far as the Bahamas Great Bank. During the year, about 20% of the lobster catch is obtained in the first 3 months, 10% in the next 3 months, 30% in the next 3 months, and about 40% in the last 3 months. About 12 kinds of lobsters have been identified in the catch. In managing the fishery, the National Fishing Institute has limited the catch to 8,400 to 10,300 metric tons annually; in addition, only lobsters 21 cm and larger are permitted to be taken. Studies indicate that the Gulf of Batabano is the major source of larvae of the Cuban lobsters. SW

.7 INFLUENCE OF FLUORIDE INTAKE ON REPRODUCTION IN MICE

Messer, H. H., W. D. Armstrong, and L. Singer (Dept. of Biochemistry, University of Minnesota, Minneapolis, MN 55455)
Journal of Nutrition 103, No. 9, 1319-1326 (Sept. 1973)

This study was carried out to find out whether fluorine is essential in the diet. In an earlier preliminary report, the authors described a progressive infertility in female mice on a restricted fluoride intake, and a recovery from infertility following addition of fluoride to the diet. The present article is a more comprehensive report of the previous study. Because other workers reported that mice are tolerant to very large intakes of fluoride, the present researchers also studied the effects of a high intake of fluoride on growth and reproduction to determine the levels at which signs of toxicity first appeared.

"Female mice were fed a low fluoride diet (0.1 to 0.3 ppm fluoride) plus drinking water containing 0, 50, 100 or 200 ppm fluoride as sodium fluoride. Toxic effects of fluoride were evidenced by retarded growth and impaired reproduction in mice with intakes of 100 and 200 ppm fluoride, and the higher level resulted in a high mortality rate (50% deaths in 5 weeks). Mice with a low fluoride intake developed signs of fluorine deficiency, with a progressive development of infertility in two successive generations. Growth rate and litter size were not affected by the low fluoride intake, but the percentage of mice producing litters was lower, and the age at delivery of the first litter was greater than in mice receiving 50 ppm fluoride."

The authors conclude that there is now strong evidence that fluoride is required in the diet, at least that of mice.

3 figures, 6 tables, 30 references] The first and last paragraph are abstracted; the second paragraph is the authors' abstract.]

0.7

On the average, the broilers fed the high-protein level diet ate a similar amount of food, grew at a slightly slower rate, and converted food to body weight less efficiently than the birds fed the medium-protein level diet. The carcass dry matter of the birds fed the 23% crude protein diet showed about 2 percentage points less ether extractives than the carcass dry matter of the birds fed the 20% crude protein diet.

During the test feeding period of from 35 to 56 days, the growth rate and feed conversion efficiency decreased as the feed allowance was reduced. Those groups fed the lowest level of food intake for 60 days showed somewhat leaner carcasses than those fed ad libitum for 56 days. The feed conversion for the birds fed the lowest level of food intake for from 35 to 60 days was less efficient than the feed conversion for the birds fed ad libitum for the shorter period of from 35 to 56 days, even though the final live weights were the same for both groups and the body fat content of the former group was lower. These results support the premise that feed efficiency is maximized when broilers reach market weight in the shortest possible time.

[5 tables, 5 references] FTP

2.00 (2.19)(1.5) COMPARISON OF CHANGES IN TRIMETHYLAMINE, DIMETHYLAMINE, AND EXTRACTABLE PROTEIN IN ICED AND FROZEN GADOID FILLETS

Castell, C. H., W. E. Neal, and J. Dale (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 8, 1246-1248 (Aug. 1973)

The effects of iced and frozen storage were compared on the production of trimethylamine (TMA) and dimethylamine (DMA), and on decreases in extractable protein nitrogen (EPN) in fillets from deep-sea Atlantic cod, pollock, cusk, and hake. The fish were obtained from trawlers as they were being unloaded at dockside, and immediately filleted. The fillets from one side of the fish from each species were individually packaged in heat sealed, laminated plastic pouches, frozen at -40° C and stored at -5° C. The opposite set of fillets were similarly pouched, packed in ice, and stored in a room which was maintained at 3° C. Periodically, fillets from each species were removed for testing until the iced fillets were entirely unfit for human consumption.

The four species of fish produced similar amounts of TMA. In the iced fish the values for TMA, after an initial lag, rose sharply until within 15 days the fillets were badly spoiled and discarded. The frozen fillets of all species exhibited no TMA within 60 days. There were differences between species in production of DMA. In the iced fish, there were only small increases in DMA in cod, pollock, and cusk; however, there was a large, rapid increase in the hake fillets. In the frozen fillets, DMA production was highest in hake, and less in the cusk, pollock, and cod, in that order. In frozen and iced fillets, the production of DMA was accompanied by a decrease in extractable protein. The DMA does not affect the

2.05 WHAT SEAFOOD PROCESSORS SHOULD KNOW ABOUT VIBRIO PARAHAEMOLYTICUS

Lee, J. S. (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Milk and Food Technology 36, No. 8, 405-408 (Aug. 1973)

This article is a compilation of information on the growth characteristics and requirements of V. parahaemolyticus. The rapid growth rate and the requirement of 2% to 4% NaCl in foods contaminated with the organism are described. Foods that are high in protein, with the required salt content, and pH levels above 5.8 will support the rapid growth of the organism. The optimum growth temperatures range between 35° and 37° C, but the organism can be inactivated by mild heat (48° C). At low temperatures, refrigeration at 3° C may be more detrimental than freezing at -18° C. Among the antibiotics tested, chlorotetracycline was the most effective at a concentration of 0.5 µg/ml. Among food preservatives, the most effective against the organism was propyl-p-hydroxybenzoate at concentrations ranging between 0.05 to 0.1 mg/ml. Sodium hypochlorite (12% available chlorine), diluted in a 3% NaCl solution to .003 of its original strength, inactivated the organism in 5 min. The major natural reservoir of V. parahaemolyticus appears to be the sea and the marine animals harvested from it. Preventing contamination of the finished product should be the objective of the seafood processor. In this activity, the time between landing and processing raw seafood must be short, and the temperature during this period should be kept low.
[36 references] SW

2.113 MARINE SUCCESSION OF FOULING ORGANISMS IN HONG KONG, WITH A COMPARISON OF WOODY SUBSTRATES AND COMMON, LOCALLY AVAILABLE, ANTIFOULING PAINTS

Lee, S. W., and L. B. Talbot (Marine Science Laboratory, Chinese University of Hong Kong, Hong Kong)
Marine Biology 20, No. 2, 101-108 (May 1973)

Macrofaunal fouling organisms, on test blocks of various types of wood, were exposed in the subtropical waters of Hong Kong. Five types of locally available antifouling paints were coated on the wood blocks which were exposed from March to October 1970 in water at a depth of 1 m.

Results of the study showed that the initial foulers growing on the control block (of Chinese fir) were species of Balanus and Bugula. The latter eventually disappeared leaving a community dominated by the Balanus species which then declined and were succeeded by species of Styela and Mytilus. These organisms dominated the community. The hydrographic data in the test period showed changes in temperature and salinity. (The fluctuation in temperature was seasonal and changes of salinity were due to rainfall.) Neither of these environmental changes affected the growth of the fouling organisms. Teak wood was used for construction of boat hulls until its excessive cost in recent years resulted in building with cheaper yacal wood. This may prove to be false economy. Of the five types of wood tested (Chinese fir, camphor wood, yacal, teak, and pine), teak was the most resistant to the foulers, and yacal was the least resistant. Five types of antifouling paint were tested. All types contained 50% to 70% cuprous oxide as the antifouling component in the pigment portion. An effective antifouling paint liberates copper at

2.115 (1.125) BAITFISH CAN BE KEPT ALIVE LONGER ON HAWAIIAN SKIPJACK TUNABOATS

Baldwin, Wayne J. (Hawaii Institute of Marine Biology, University of Hawaii, Honolulu, Hawaii)
National Fisherman 54, No. 6, 6C-7C, 9C (Oct. 1973)

The baitfish used by the Hawaiian pole-and-line fishery for skipjack tuna is the Hawaiian anchovy or nehu. The baitfish is small and delicate, and it usually dies rapidly in bait wells where it is placed after capture. Experiments with nehu have shown the necessity for making changes in the sampan style of bait well, which will reduce mortalities. The results of the experiments culminated in the design of a 600-gal-capacity prototype bait well with the following improvements: an oxygen addition system, a protein skimmer, raised deck cowling, forced-water exchange system, dispersed lighting, rounded corners, circular water current, central bottom drain, and smooth interior surface painted green and free of obstructions. The experiments showed that introducing pure oxygen into the water was necessary during the first hour of capture to reduce mortalities of the bait fish. The oxygen addition system added to the bait well satisfied this requirement. To maintain the quality of water, a protein skimmer was added in the form of an air supply which released a column of fine bubbles to the surface and formed a foam containing waste organic material. The foam is removed through a drain trough, at the top of the well, with the help of a fine water spray. Placing nehu in brackish water immediately after capture also reduced mortalities. The forced-water exchange system, which is part of the improved design, can be operated as an open or closed system. After starting the baitfish on brackish water, the system can

2.114 TOXIC METAL FUMES FROM MANTLE-TYPE CAMP LANTERNS

Griggs, Kyle (Lawrence Livermore Laboratory, University of California, Livermore, Calif.)
Science 181, No. 4102, 842-843 (Aug. 31, 1973)

The mantle of camp lanterns contains about 600 µg of beryllium metal. During the first 15-min use of a new mantle, most of the beryllium is volatilized and is airborne. Inhalation of the air in a confined space such as a cabin or camper containing this quantity of beryllium can be hazardous. There are two forms of beryllium disease: the chronic form, which can develop after exposure to low concentrations over a long period of time; and the acute form which can result from a single exposure to a high concentration of beryllium for a short time. The American Industrial Hygiene Association recommends that to prevent the acute form of the disease, concentrations of 25 µg of beryllium per cubic meter of air should not be exceeded. In the process of lighting a lantern with a new mantle, the face of the user usually is in close proximity to the flame, and emissions from the mantle can be inhaled. Users of gas lanterns should be aware of the hazard from the mantle.
[1 figure, 1 table, 1 reference] SW

2.115 (1.125)

be operated as a semiclosed system which slowly introduces fresh seawater, as the brackish water in the well is being recirculated, until the seawater is at full strength (after about 3 h). The bottom drain is a feature that permits quick removal of dead fish or other debris quickly without disturbing the nehu. The reduction in mortalities after incorporating these improvements into a bait well are expected to be within the range of 5% to 10%. A plumbing diagram and a cutaway drawing show all the features installed in a bait well.
[5 figures] SW

2.11 PLASTIC MATERIALS USED FOR FISHERIES
(2.112)

Honda, Katsuji (Japan)
Chemical Abstracts 79, No. 6, 32526y (Aug. 13, 1973)

2.00 (2.19)(1.5)

protein; however, production of DMA in the muscle is accompanied by a corresponding amount of formaldehyde which insolubilized the protein. Hake has a reputation for poor keeping qualities, and those that arrive on trawlers after 3 or 4 days on ice are in poor condition. The presence of DMA in the muscle of the hake can be predicted. If these fish are used for food, the DMA under acid conditions, as in the digestive tract, can combine with nitrites to form nitrosamines which are carcinogenic. For this reason, hake should be stored in a manner that will prevent DMA production.
[2 figures, 10 references] SW

1.89 OCTOPUS AND SQUID. THE SOFT INTELLIGENCE
(9.6)

Cousteau, Jacques-Yves, and Philippe Diolé
Translated by J. F. Bernard
Doubleday & Co., Inc., Garden City, N.Y. (1973), 304 pp. Price $9.95.

This book describes the life history of the octopus and squid, with notes on the Nautilus. In popular language, the authors described the habits of each species and the geographical locations where they are found. Many photographs, in color and in black and white, illustrate the points of the descriptions. In appendix I, the biology and nomenclature of the class Cephelapoda are described with many line drawings. In appendix II, the relationship of the octopus to man is described: as food, as a subject of art, and as a monster of myth. In appendix III, the giant nerve fibers of the squid Loligo, used as a model in the elucidation of nerve action and physiology, are described. An illustrated glossary of terms used, a short bibliography, and an index complete the book. SW

2.113

a rate greater than 10 µg/cm^2/day. This release is controlled by the matrix holding the antifouling substance. The test paint containing 61.80% pigment (by weight), with 49.08% cuprous oxide in the pigment, was the most resistant to the fouling organisms.
[3 figures, 2 tables, 31 references] SW

2.15 SHRIMP SEPARATING METHODS

Lovett, Jack R. (Orange, TX 77630) (pat.)
U.S. Patent 3,750,233 (Aug. 7, 1973)

This invention deals with a method and the apparatus for separating, aboard vessel, combined catches of shrimp and fish. The process applies in particular to shrimp fishing operations where both shrimp and fish are caught in the trawl net. After the net load of shrimp and fish is hauled aboard the boat, electrodes are inserted into the net load and both shrimp and fish are electrocuted. The catch is then dumped into a flotation tank that is part of the sorting machine aboard ship. The shrimp sink to the bottom where they pass through an inclined screen and are removed from the tank by a conveyor. The shocked fish float on the water, and they are removed by inclining the lower portion of the screening tray and dumping the larger fish onto a conveyor. The smaller fish are flushed out of the tank by the continuous flow of water supplied to the tank. The fish are then conveyed to the fishmeal plant (aboard ship) or dumped overboard. FTP

2.3 (9.15) POTENT PYRETHROID INSECTICIDES FROM MODIFIED CYCLOPROPANE ACIDS

Elliott, M., A. W. Farnham, N. F. Janes, P. H. Needham, and D. A. Pulman (Rothamsted Experimental Station, Harpenden, Hertfordshire AL5 2JQ, England)
Nature 244, No. 5416, 456-457 (Aug. 17, 1973)

Pyrethrin I is a very active, natural insecticide against a wide variety of insects. It does not leave persistent residues, and it has low oral toxicity to mammals. Bioresmethrin is a synthetic compound related to pyrethrin I but it is about 50 times more active and less toxic. These two compounds are esters of (+)-trans [IR,3R]-chrysanthemic acid. By modifying the acid side chain in bioresmethrin so that the four carbon atoms in the isobutenyl group are rearranged to a but-1-enyl substituent, the authors have been able to increase the insecticidal activity of the original compound 100 times more than pyrethrin I while retaining low mammalian toxicity. Other changes of the acid side chain in bioresmethrin have further increased insecticidal activity. The primary point in the pyrethrin I molecule for metabolic attack by insects and mammals is the trans (E)-methyl group. The authors experimented with the compound by addition of substituents at this point with the purpose of suppressing a detoxification route. The most active insecticidal substituent obtained was a cis-(Z)-butadienyl side chain. The authors suggest that the insecticidal activity of pyrethrinlike compounds can be increased by small changes in the molecule at sites not directly involved in the poisoning process. The new compounds described in the article are under UK Patent Applications Nos. 24809/72, 24811/72, and 308038/72.
[2 figures, 1 table, 13 references] SW

3.15 (2.43) PACKAGING ASPECTS OF IRRADIATED FLESH FOODS: PRESENT STATUS. A REVIEW

Agarwal, S. R., and A. Sreenivasan (Biochemistry and Food Technology Division, Bhabha Atomic Research Centre, Bombay, India)
Journal of Food Technology 8, No. 1, 27-37 (Mar. 1973)

This review of the packaging aspects of irradiated flesh foods covers criteria for selecting suitable packaging materials for radurized and for radappertized foods, the safety aspects of irradiated packaging materials, and the behavior of flexible and rigid containers to ionizing radiation. Radiation treatment of foods is broadly classified into two categories: radurization, involving doses of less than 1 Mrad for extension of the refrigerated shelf life of foods, and radappertization, involving doses up to 4-6 Mrad for long-term storage of foods without refrigeration. The radiation stability of flexible packaging materials is as follows: Polystyrene and polyethylene terephthalate--excellent; Polyamides--good; Polyethylene, polyvinyl chloride, and polyvinylidene chloride copolymer--fair to good; Polypropylene--fair; and Polytetrafluoroethylene, cellophane, and paper--poor. Approved flexible packaging materials for gamma irradiated foods are:

Radurized foods (maximum dose of up to 1 Mrad)

Nitrocellulose coated cellophane; glassing paper; wax coated paperboard; polypropylene film with or without adjuvants; ethylene-alkene-1-copolymer; polystyrene film with or without adjuvant substances; rubber hydrochloride with or without adjuvant substances; vinylidene chloride-vinylchloride copolymer film; polyolefin film with or without adjuvant substances or vinylidene chloride coatings; polyethylene terephthalate with or without adjuvant substances or vinylidene

2.3 APPARATUS FOR REMOVING SHELLS FROM CRUSTACEA

Lapeyre, James M. (New Orleans, LA 70115) (pat.)
U.S. Patent 3,745,609 (July 17, 1973)

The apparatus is used to separate the meat from the shells of crustacea (shrimp, crab, lobster, crayfish). The crustacea shell [parts ?] are dropped onto a rotating disk and then are forced to travel a spiral pathway at increasing speed. The path of the moving crustacea parts is controlled by a volute guide; as the parts move they are subjected to an incising action of knifelike projections in their pathway. Finally, the meat and shells are introduced into a flotation bath for separation; the shells sink, and the meat floats and is skimmed off. FTP

2.3 EXTRUSION PROCESS

Smadar, Y.; DCA Food Industries Inc. (pat.)
Canadian Patent 927,181
Food Technology 27, No. 9, 119 (Sept. 1973)

Foodstuff slurries are extruded in a form with a gellike skin; this skin is brought about by the action of alginates and gelling agents (alkaline earth ions) at the surface of the extrusion product. FTP

3.231 SLIDING DOOR SYSTEMS FOR COLD CHAMBERS

Van der Speck, W. (Markus Hermetic Doors Ltd.)
Refrigeration and Air Conditioning 76, No. 903, 29-32 (June 1973)

The greatest advantage of the sliding door for cold chambers lies in the reduced space it requires for opening. The increased use of the forklift truck in warehouse operations necessitated the use of bigger door openings which only the sliding door arrangement could conveniently satisfy. The openings into cold storage areas should not be bigger than necessary. Cold air losses and moisture penetration increase with the size of the door opening. In determining the width and height of a door opening, the size of the forklift truck and its ease of entry must be taken into account. If entry to the door is from a narrow corridor with a corner, then the opening should be wide to allow easier access by the forklift truck. The height of the door opening must be related to the corridor height, also. The requirements that a sliding door must satisfy are as follows: (1) it must have the same insulation value as the chamber walls, (2) a 100% airtight seal on frame and sill, (3) fast opening and closing, (4) ease of maintenance, (5) mechanical strength (to remain intact after being struck by a forklift truck), and (6) simplicity of operation. To seal the door hermetically, a flexible gasket must be applied to the frame and sill. Before the door is slid open, the gasket must be freed from its position to prevent damage to the seal and to ensure that the door slides open easily. Seven systems with diagrams are shown that may be designed into a sliding door to satisfy the requirements listed.
[1 photograph, 7 diagrams] SW

2.3 SHRIMP PROCESSING MACHINE AND METHOD

Jonsson, Gregor (Lake Forest, Ill.) (pat.)
U.S. Patent 3,751,766 (Aug. 14, 1973)

This shrimp processing machine contains an intermittently operating conveyor from which the beheaded shrimp (tails) are grasped (terminal end of tail piece first) and pulled onto a rotary wheel turning at a uniform rate. The shrimp shell and part of the meat are slit; the sand vein is removed by a revolving brush. A mechanism separates the meat from the shell and delivers the meat to a discharge conveyor. FTP

3.2343 (3.237) FOOD FREEZING PROCESS

Knutrud, L. B. (pat.)
Canadian Patent 927,193
Food Technology 27, No. 9, 119 (Sept. 1973)

Frozen fish fillet blocks are produced in a mold placed between freezer plates; the mold has a frame which gives poor heat conductivity between the sides of the fillet block and the freezer plates. FTP

2.3 APPARATUS FOR EXTRACTING VISCERA FROM FISH

Grimes, Eldon H.; Marine Construction & Design Co., Seattle, Wash. (pat.)
U.S. Patent 3,754,301 (Aug. 28, 1973)

The apparatus is used to remove the viscera from beheaded fish (primarily salmon). Pressure is applied mechanically to the beheaded fish supported flatwise in a horizontal plane; a rolling action progressing from the tail to the head end extracts the viscera. It can operate on fish of varying types, sizes, or condition. It is effective in removing the roe without appreciable damage. FTP

3.15 (2.43)

chloride coatings or polyethylene coatings; nylon 11; and vinylidene chloride copolymer coated cellophane.

Radappertized food (maximum dose of up to 6 Mrad)

Vegetable parchment; polyethylene film with or without adjuvants; polyethylene terephthalate with or without adjuvants; nylon 6 films with or without adjuvants; and vinyl chloride-vinyl acetate copolymer film with or without adjuvants.

The packaging material for irradiation-treated fish products must have good gas and vapor barrier properties, otherwise the shelf life of the product is likely to be adversely affected. Oxygen must be excluded from the package while irradiating fatty fish to limit oxidative changes; packaging radurized fish under vacuum is also beneficial for increasing shelf stability.
[2 tables, 66 references] FTP

2.3 DEEP FAT FRYING

Marmor, R. A.; Pillsbury Co. (pat.)
U.S. Patent 3,733,202
Food Technology 27, No. 9, 119 (Sept. 1973)

This deep fat fryer contains a system for introducing a small amount of moisture into the fat at a point where the fat enters the vessel in order to distill off undesirable fat breakdown products. FTP

3.2493 LIPID HYDROLYSIS, OXIDATION, AND AGING IN FROZEN FISH

Toyomizu, Masamichi, and Toshihiko Shono (Fac. Agric., Kyushu Univ., Fukuoka, Japan)
Japan)
Chemical Abstracts 78, No. 11, 70262w (Mar. 19, 1973)

2.3 PACKAGED SEAFOOD PRODUCTS

Spears, D. S.; Blue Channel Corp. (pat.)
U.S. Patent 3,736,153
Food Technology 27, No. 9, 114 (Sept. 1973)

Seafood products in processing liquid-containing copper or iron ions are packaged in a metallic can lined with aluminum foil; the can and product had been processed by heating. FTP

3.12 PRESERVATION OF POMFRET WITH CHLORTETRACYCLINE

Jadhav, M. G., and N. G. Magar (Dep. Biochem., Inst. Sci., Bombay, India)
Chemical Abstracts 79, No. 5, 30569r (Aug. 6, 1973)

4.21 PRO- AND ANTIOXIDANT EFFECTS OF SOME AMINO ACIDS UPON FISH OIL

Jurewicz, I., and J. Salmonowicz (Sea. Fish. Inst., Gdynia, Poland)
Chemical Abstracts 79, No. 3, 17069h (July 23, 1973)

4.21 EFFECT OF TOCOPHEROL CONCENTRATION IN SOME FISH OILS UPON THEIR OXIDATION

Brzeska, Z., and J. Salmonowicz (Sea Fish. Inst., Gdynia, Poland)
Chemical Abstracts 79, No. 3, 17050v (July 23, 1973)

4.90 (0.7) A FEEDING STUDY OF A USED, PARTIALLY HYDROGENATED SOYBEAN OIL, FRYING FAT IN DOGS

Nolen, Granville A. (Procter and Gamble Co., Miami Valley Laboratories, P.O. Box 39175, Cincinnati, OH 45239)
Journal of Nutrition 103, No. 9, 1248-1255 (Sept. 1973)

In an earlier study, the author and his coworkers showed that certain fats commonly used for deep fat frying of foods (under simulated commercial conditions), had no adverse effect on rats when fed at levels of 15% in their diet for 2 years. In the present study, the author determined the effect of a used frying fat on the dog. Partially hydrogenated soybean oil (iodine value of 107) was selected as a representative frying fat.

"Partially hydrogenated soybean oil (IV 107) was used for deep fat frying under commercial conditions until it reached the end of its useful frying life. This used fat, or a fresh fat control, was fed to two male and two female dogs at levels of 15% in a semipurified diet. Their effects were compared to those of a commercial dog feed from shortly after weaning until the dogs were 54 weeks old. There was no apparent difference in the growth of female dogs fed all three diets. The male dogs fed the diet with used fat grew about the same as those fed the commercial dog feed, but both groups had reduced growth compared to dogs fed the diet with fresh fat. As in the rat studies, this reduced rate of growth for males was attributed to the lower absorbability of the used fat compared to the fresh. Otherwise, histopathological and clinical examinations showed that all of the dogs fed the three diets were in good health."

5.120 ZINC: A TRACE ELEMENT ESSENTIAL IN VITAMIN A METABOLISM

Smith, J. Cecil, Jr., E. G. McDaniel, F. F. Fan, and James A. Halsted
Science 181, No. 4103, 954-955 (Sept. 7, 1973)

Other reports suggest that there is an interrelationship between vitamin A and zinc. In tests to elucidate the relationship, two groups of rats were fed identical diets containing vitamin A, but one diet was deficient in zinc. The rats were fed these diets for 104 days. The results show that vitamin A levels in liver were similar in both groups, but the vitamin A levels in the plasma of the group fed the zinc deficient diet were lower. The authors suggest that vitamin A was not being adequately mobilized from the liver to the plasma in the zinc deficient rats. Further tests were performed to determine the effects of zinc on the mobilization of liver vitamin A. Germ-free rats were fed a diet devoid of vitamin A and zinc for 28 days. This induced symptoms of vitamin A and zinc deficiencies. The rats were divided into two groups: one group was given 80 µg vitamin A orally thrice weekly for 14 days; the other group was given vitamin A similarly plus 200 µg zinc intraperitoneally thrice weekly for 14 days. Plasma, liver, and dietary levels of vitamin A were determined fluorometrically by a method similar to that of J. N. Thompson, P. Erdody, R. Brien, and T. K. Murray [Biochem. Med. 5, 67 (1971)]. In the group fed vitamin A without zinc, liver levels of vitamin A were higher, and plasma levels of vitamin A were lower than in the group given the vitamin and zinc. These results indicate that without sufficient zinc, vitamin A accumulates in the liver and is not mobilized to maintain normal concentrations in plasma. The authors suggest that the results of these experiments indicate that

6.54 FISH PROTEIN

Astra Nutrition AB (pat.)
British Patent 1,313,053
Food Technology 27, No. 9, 114 (Sept. 1973)

Strips of fish flesh are washed and sprayed with water, heated with live steam, and then fed to a separator where the bones and meat are separated. The meat is homogenized and centrifuged to remove fat, soluble substances, and skin fragments. The remaining meat material is dried in preparation for solvent extraction to remove residual fat or undesirable flavors. FTP

6.54 FISH PROTEIN POWDER

Carpenter, Roland Paul, George Matn, and Anthony H. Sutton (Unilever N. V.) (pat.)
German Offen. 2,254,614 (May 17, 1973)
Chemical Abstracts 79, No. 5, 30691z (Aug. 6, 1973)

4.90 (0.7)

It was concluded, that partially hydrogenated soybean oil (iodine value of 107) which had been used for deep fat frying of foods was wholesome and nutritious when fed to dogs as 15% of their diet. However, there was some limitation of weight gains, due to the lower coefficient of absorbability for the used fat, but this was not considered harmful.
[2 figures, 10 tables, 11 references] [First and last paragraphs are abstracted; the second paragraph is the author's abstract]

.91

THE LIPID COMPOSITION OF THE BLOOD OF MARINE MAMMALS--III. THE FATTY ACID COMPOSITION OF PLASMA AND ERYTHROCYTES OF ATLANTIC BOTTLENOSE DOLPHIN, TURSIOPS TRUNCATUS

Nelson, Gary J. (Bio-Medical Div., Lawrence Livermore Laboratory, University of California, Livermore, CA 94550)
Comparative Biochemistry and Physiology 46, No. 2B, 257-268 (Oct. 15, 1973)

This article reports the fatty acid composition of the whole plasma and erythrocytes of Atlantic bottlenosed dolphins. The plasma showed 27% saturated fatty acids, 46% monounsaturated, and 27% polyunsaturated. The erythrocytes showed 33% saturated fatty acids, 33% monounsaturated, and 33% polyunsaturated. The erythrocytes contained 13.3% arachidonic acid and the plasma contained only 2.5%. The so, anteiso, and multibranched chain fatty acids constituted minor (but significant) components of the fatty acid profile of the plasma, but they were present t markedly lower levels (or not detected at all) in the erythrocytes. The plasma atty acids showed a typical marine fatty acid profile, reflecting the dietary fat ntake of the dolphin. The red cell fatty acids, which are mainly synthesized ndogenously, were similar in composition to those of terrestrial animals except hat they had lesser amounts of 18-carbon unsaturated fatty acids.
2 figures, 3 tables, 36 references]

FTP

6.31 [CONTRIBUTIONS TO THE STUDY OF THE BIOLOGY AND CULTIVATION
(6.36) OF SEA-ONION IN ALGERIA]
CONTRIBUTION A L'ÉTUDE DE LA BIOLOGIE ET DE LA CULTURE DE LA SCILLE MARITIME EN ALGERIE

Blanchard, M. (INRA, CNES, SNES, La Miniere, Versailles, France)
Agron. Trop. 27, No. 11, 1101-1114 (1972) (In French)
Aquatic Sciences & Fisheries Abstracts 3, No. 6, 27, Abstract No. 3G9729M (June 1973)

The sea onion is a plant with pharmaceutical properties which include cosmetic conditions of depressed vitamin A in plasma that do not respond to vitamin A therapy may respond to therapeutic doses of zinc.
[1 figure, 1 table, 8 references]

SW

5.120

The sea onion is a plant with pharmaceutical properties which include cosmetic conditions of depressed vitamin A in plasma that do not respond to vitamin A therapy may respond to therapeutic doses of zinc.
[1 figure, 1 table, 8 references]

SW

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6. NEW METHODS
(1.951) PRODUCTION OF FEED MEAL FROM CASPIAN SEAL CARCASSES

Olenchenko, G. N., and A. A. Magomaev (Dagest. Gos. Univ. im. Lenina, Makhachkala, U.S.S.R.)
Chemical Abstracts 78, No. 23, 146496y (June 11, 1973)

4.11
(7.590) NEW METHODS

Newman, H. A. I., and Peter E. Braun (compilers)
Journal of Lipid Research 14, No. 5, 602-603 (Sept. 1973)

This bibliography lists 58 selected references to analytical lipid methods published recently (1972 and 1973).

FTP

7.0 SAMPLING TECHNIQUES IN CHROMATOGRAPHY

Karasek, F. W. (Dept. of Chemistry, University of Waterloo, Waterloo, Ontario, Canada)
Research/Development 24, No. 9, 54-57 (Sept. 1973)

The micro sample sizes used in gas and liquid chromatography (GC)(LC) require careful handling to ensure the output of accurate data. The care and technique exercised may be modified depending on whether the objective is qualitative or quantitative analysis. The method widely used to introduce a sample into GC is syringe injection through a septum (a port with flexible plugs and seals). The syringes of one manufacturer range in capacities from 1 µl to 50 ml. Because the GC column head is at elevated pressure and temperature, there are three major sources of improper sample injection: a leaking septum, sample blowback between the barrel and plunger of a worn syringe, and nonuniform volatilization of the sample with retention of heavy components in the needle. The first two problems can be corrected with new replacements; however, sample blowback is not easily recognized. Nonuniform volatilization of the sample requires modification of the technique. Penetration of the septum causes immediate vaporization of the sample contents in the needle leaving less volatile components behind. This problem can be eliminated by first drawing a large volume of solvent into the syringe followed by a small volume of air and then drawing in the sample. This technique is used extensively in pesticide analysis. A port for entry into the column such as a septum, can become worn after 50 to 80 sample injections. A valve arrangement can be used for sample admission many thousands of times. In addition to introducing samples into a column, valves can be used either for backflushing the column, or

7.8 (7.44) COLLABORATIVE STUDY OF THE DETERMINATION OF AMMONIA AS AN INDEX OF DECOMPOSITION IN CRABMEAT

Steinbrecher, Kurt (Food and Drug Administration, 909 First Ave., Seattle, WA 98104)
Journal of the Association of Official Analytical Chemists 56, No. 3, 598-601 (May 1973)

A colorimetric method for the determination of ammonia in crab meat at various stages of quality was examined by collaborators in six different laboratories. The colorimetric method involved the reaction between ammonia, thymol, and alkaline bromine water. The crab meat was allowed to stand at room temperature; at periodic intervals the meat was examined organoleptically and assayed for ammonia content. Statistically significant differences in the ammonia content of the crab meat were found at specific defined stages of decomposition.
[1 figure, 4 tables, 7 references] FTP

7.42 DETERMINATION OF AMMONIA IN AQUARIA AND IN SEA WATER USING THE AMMONIA ELECTRODE

Gilbert, Thomas R., and Alice M. Clay (New England Aquarium, Boston, MA 02110)
Analytical Chemistry 45, No. 9, 1757-1759 (Aug. 1973)

The two widely used methods for the determination of ammonia in sea water have limited applicability to routine analysis because of interference from other nitrogenous compounds, complexities of blank correction or sample contamination, and time-consuming procedures. An analytical procedure which reduced the limitations of the other methods is available, and it uses an electrode for the determination of ammonia in aqueous solutions. The electrode consists of a hydrophobic gas-permeable membrane which separates the alkaline test solution from an internal solution, 0.1M ammonium chloride. A glass pH electrode and a silver-silver chloride reference electrode are immersed in the internal solution.

The authors tested the electrode for reproducibility and accuracy. They found that the relative precision of the analyses was fairly constant over a wide concentration range. In addition, they found the electrode method provides an accurate means of analyzing for ammonia in sea water; it is more precise than the spectrophotometric methods, and it is well suited for field work.
[1 figure, 3 tables, 7 references] SW

7.86 (0.5) A STANDARDIZED REVERSED PASSIVE HEMAGGLUTINATION TECHNIQUE FOR THE DETERMINATION OF BOTULINUM TOXIN

Evancho, G. M., D. H. Ashton, and E. J. Briskey (Campbell Institute for Food Research, Camden, NJ 08101), and E. J. Schantz (Food Research Institute, University of Wisconsin, Madison, WI 53706)
Journal of Food Science 38, No. 5, 764-767 (July-Aug. 1973)

Proper treatment for botulism victims and identification of the implicated food for prompt removal from distribution necessitates rapid detection and typing of botulinum toxin. The currently accepted method is time consuming and has other disadvantages; any method to replace it should be as sensitive and also more rapid. The authors reviewed the literature on the qualitative and quantitative determination of botulinum toxin in foods. One procedure used reversed passive hemagglutination which was the basis for the development of a new test. The new test used the following preparations and procedures. Formalin-preserved sheep erythrocytes (SRBC) were washed and diluted to 2.5% with saline and refrigerated until needed. Antiserum against botulinum type A toxin was prepared by injecting rabbits with toxoid preparations. Antitoxin globulin was prepared from rabbit antiserum by multiple precipitation with ammonium sulfate followed by dialysis to remove the sulfate ions. It was stored frozen until needed. The SRBC were tanned with tannic acid, washed, and resuspended to a 2.5% concentration in saline. The tanned SRBC were sensitized by mixing with antitoxin globulin (prepared earlier) and incubating at 24°-27° C for 10 min. The sensitized cells were centrifuged, washed in phosphate-buffered saline (PBS) containing 0.5% normal rabbit serum (NRS) and resuspended in the same. In the hemagglutination procedure, serial dilutions of

7.0 PREPARING HIGH EFFICIENCY PACKED GC COLUMNS

Leibrand, Roger J. (Scientific Instrument Div., Hewlett-Packard, Palo Alto, Calif.), and Loren L. Dunham
Research/Development 24, No. 9, 32-36, 38 (Sept. 1973)

The authors suggest that by improving the efficiency of GC (gas chromatographic) columns smaller samples can be used in shorter columns at lower temperatures. These improvements can result in better separations and analyses in less time. The authors gave suggestions for improving the efficiency of GC columns. In the area of support variables, the material should have good mechanical strength, be of small, uniform particle size, and be deactivated by thorough washing with HCl. An improved deactivation and vapor silanization technique for GC support material is also given. In the area of liquid phase variables, use of material that is initially liquid, rather than a solid that becomes liquid in the column, increases efficiency; more polar phases form better films and increase efficiency of the column; the thinnest possible film of the liquid phase increases efficiency of the column; degassing the support material improves efficiency; fluidized drying is more efficient than tray drying; and very little conditioning of siloxane phases at high temperature is necessary. An improved technique for solution coating of support material is described. In the area of construction variables, the authors suggest U-shaped columns of narrow bore made of silane-treated Pyrex with an added deactivation treatment. In the area of operating variables, the authors suggest the use of the lowest inlet pressure possible, using helium gas as the best compromise. A very small amount of sample injected in a short period of time is the ideal technique. Calculations are best performed by means of the equations of A. B. Littlewood [Gas Chromatography, Academic Press, New York (1962)].
[5 figures, 17 references] SW

7.86 (0.5)

toxin, toxoid, or toxin-containing samples were prepared (using NRS in PBS as the diluent) in 0.5-ml amounts in tubes. SRBC (prepared earlier) was added to the tubes in 0.05-ml amounts. Hemagglutination patterns were observed in the tubes after incubation for 2 h at 24°-27° C. A parallel series of microtiter tests were run also, with slight modification of the procedures. In tests of food products contaminated with Clostridium botulinum, it was sometimes necessary to add washed SRBC to the samples (followed by washing and centrifugation) to remove substances that caused nonspecific agglutination.

Both the tube and microtiter techniques were found to be successful for toxin detection. The end point for 20 hemagglutination tests with crystalline type A toxin or toxoid was 0.0008 µg/ml using chromic chloride sensitized SRBC (a slight modification of sensitizing SRBC in buffer). This represents a toxin level of about 27 mouse LD_{50}, if one mouse Ld_{50} equals 0.00003 µg. No cross reactions with other types of botulinum toxin, or extracts of foods inoculated with C. sporogenes, occurred with type A antiglobulin sensitized cells. The toxin content of a food extract can be read directly from a standard table that can be set up with this procedure. There was excellent correlation between this technique and the currently accepted mouse assay technique.
[2 tables, 20 references] SW

.0

sample selection, or detector switching, or concentration techniques. Effective valve operation requires low internal dead volume, no leakage between ports of the valve, reliability over many injection cycles, and resistance to high temperatures. Valves with three to eight ports can be used in 18 different combinations. Valves constructed of tantalum may be used in the analysis of corrosive organic and inorganic samples. Most sampling valves are used in process controls. The devices and methods used in injecting GC samples may be adapted for use in LC.
[4 figures, 15 references] SW

7.8 (3.239) COLLABORATIVE STUDY ON A TEST TO DETERMINE WHETHER SHUCKED OYSTERS HAVE BEEN FROZEN AND THAWED

Gould, Edith (National Marine Fisheries Service, U.S. Dept. of Commerce, Milford, CT 06460)
Journal of the Association of Official Analytical Chemists 56, No. 3, 541-543 (May 1973)

A method, utilizing the differing electrophoretic migration rates of various forms of malic enzyme activity, was tested to discern whether shucked oysters had been frozen and thawed. Normally a soluble form of malic enzyme activity is present in unfrozen oysters; additional latent forms of the enzyme are solubilized by freezing and thawing the tissue, presumably as a result of disruption of the cellular tissue. The method combines polyacrylamide gel electrophoresis and a specific histochemical medium [E. Gould and M. J. Medler, JAOAC 53, 1237-1241 (1970)]. Five laboratories tested the oyster Crassostrea virginica and one tested C. gigas. Four treatment variables were used: fresh-unfrozen; fresh-frozen/thawed; stale-unfrozen; and stale-frozen/thawed. On the basis of malic enzyme enzymograms the various laboratories were able to clearly distinguish between unfrozen oyster meats and those meats that had been frozen and thawed. The method is valid for both species of oysters tested. Apparently, neither autolyses nor bacterial action altered the enzymographic patterns.
[1 figure, 2 tables, 2 references] FTP

7.0 POLYACRYLAMIDE GEL DISC-ELECTROPHORETIC IDENTIFICATION OF FISH (FAMILY GADIDAE) (1.5)

Lozano Simal, J., A. Charro Arias, and E. Alvarez Vega (Fac. Farm., Cons. Super Invest. Client., Santiago Compostela, Spain)
Chemical Abstracts 79, No. 7, 40126h (Aug. 20, 1973)

8.0 1973-74 INGREDIENT ANALYSIS AND ESTIMATED FEED VALUE TABLES FOR BEEF AND SHEEP GROWING-FINISHING RATIONS

Morrison, S. H. (Agricon, Claremont, Ontario, Canada)
Feedstuffs 45, No. 37, A:5, 7, 9, 12, 14, 16, 18, 20 (Sept. 10, 1973)

This report consists primarily of two tables. The first gives the average analyses for common feed ingredients; these analyses include dry matter, crude protein, fat, fiber, nitrogen-free extract, calcium, phosphorus, total digestible nutrients, digestible protein, and estimated net energy. The author suggests that the nutritionist and feedyard owner should use the values in the table only as guides for calculating feedlot rations for fattening lambs and cattle.

The second table represents an attempt to estimate the feed "value" for various ingredients as "grain" replacements for No. 2 yellow corn, and/or as "protein" replacements for 45% protein grade solvent soybean meal. The data represent the practical results obtained by feedlot operators with the various feed ingredients.

For information on how to obtain copies of these ingredient analyses and feed value tables write to the Reader Service Dept., Miller Publishing Co., P.O. Box 67, Minneapolis, MN 55440. FTP

9. (9.6) COASTAL ZONE BIBLIOGRAPHY: CITATIONS TO DOCUMENTS ON PLANNING, RESOURCES MANAGEMENT AND IMPACT ASSESSMENT

Sorensen, Jens, and Marie Demers (University of California)
Sea Grant Publication No. 8, IMR TR-43, Institute of Marine Resources, University of California, P.O. Box 1529, La Jolla, CA 92037 (ed. 1) (Aug. 1973), 89 pp.

This computer automated bibliography of 1,167 references was prepared as support to the University of California Sea Grant Research Project. The objective of the research project is to develop methods to assess the environmental and socioeconomic impacts of coastal development and resource use. The impact assessment method that is being developed involves the construction of networks and checklists to systematically identify the potential environmental and socioeconomic impacts that may be generated by a proposed coastal development or resource use. The intent of this bibliography is to provide documentation of the actual occurrence of and the research reports on each of the potential impacts identified by the networks and checklists. A complete description of the environmental impact assessment method and the relation to computer automated bibliographies may be found in "Procedures and Programs To Assist in the Environmental Impact Statement Process" by J. C. Sorensen and Mitchell Moss (Available from the Sea Grant Offices at the University of Southern California or University of California, San Diego, Calif.). FTP

9. (1.83)(1.017) COMPETITION BETWEEN SEA URCHINS AND ABALONE

Shepherd, S. A. (South Australian Dept. of Fisheries, Adelaide, Australia)
Australian Fisheries 32, No. 6, 4-7 (June 1973)

Fishable abalone stocks may be displaced by sea urchins because of ecological imbalance in the southeast coast of Australia. This competition may partly be due to the manner in which they feed. The sea urchin grazes on the seaweed nonselectively and crops it close to the supporting ground and rocks. When concentrations of sea urchins are high, grazing may be excessive and cause areas of rock to become barren of seaweed and other growth. On the other hand, the abalone feeds on the same plants as the sea urchins but grazes selectively and does not crop closely. The reduction of the plant resources by the sea urchin places the abalone at a competitive disadvantage, that is, unable to maintain its population level. The sea urchin then displaces the abalone, if other ecological conditions are not altered. Overfishing of the abalone can contribute to these conditions. Increased growth of seaweed results from the reduced abalone population and makes more food and shelter available for the sea urchin. This can cause an additional decline of the abalone population because of the reduction in its food and shelter. These views are corroborated by the history of the lobster fishery in St. Margaret's Bay, Nova Scotia. There, lobsters were the main predators of sea urchins which graze on seaweed. Overfishing the lobster stocks caused a population explosion of the sea urchins which in turn overgrazed the seaweed forests--the basic producer of the

9.11 (1.8) ACCUMULATION OF FOSSIL CO_2 IN THE ATMOSPHERE AND THE SEA

Fairhall, A. W. (Institute of Nuclear Sciences, Lower Hutt, New Zealand)
Nature 245, No. 5419, 20-23 (Sept. 7, 1973)

The high consumption of fossil fuels has resulted in the increased concentrations of CO_2 in the atmosphere and the oceans. A mathematical model was prepared which could be used to account for the increased concentration of CO_2 in the biosphere and to predict trends and phenomena not previously observed. This model is based on the premise that the land part of the biosphere (on which green plants live) is insufficient to be a major absorber of increased atmospheric CO_2; consequently, the oceans are selected to be the major site for the absorption of CO_2. In models prepared by other workers, the amount of CO_2 that can be absorbed by the mixed layer of the oceans is small. The author's model accounts for increased absorbtion of CO_2 in the oceans by dividing them into areas supersaturated with CO_2 (the tropical Pacific) and areas undersaturated with CO_2 (the North Pacific). The supersaturated water can increase absorption of CO_2 because of contact with the increased CO_2 concentration in the atmosphere; the undersaturated water can absorb CO_2 by diffusion from the burden of CO_2 in the mixed layer of water. The chemical reaction by which CO_2 is absorbed into seawater could cause the concentration of calcium carbonate to go from supersaturated to unsaturated. Seawater with an unsaturated concentration of calcium carbonate would cause the shells of calcareous organisms to dissolve including the coral reefs. The model predicts that the additional amount of CO_2 to produce this reduced concentration of calcium carbonate will have accumulated in seawater by the year 2008, if the current growth of fossil

9. (1.83)(1.017)

ecosystem. This led to a further decline in the lobster stocks. The author suggests that removal of sea urchins from the areas of overgrazed, barren rocks in southeastern Australian waters will result in reestablishment of seaweed followed by an increase in the abalone population.
[3 figures, 3 photographs, 4 references] SW

9.11 (1.8)

fuel consumption continues. The author suggests that the proposed model is twice as accurate as previous models, and the trend of increased concentration of CO_2 in seawater should be detectable in 3 to 5 years. If the trend is confirmed, the author concludes that there will be very little time left to consider what can be done about it. However, the author further suggests that if the calcareous organisms can build shells in undersaturated concentrations of calcium carbonate and if the shells remain undissolved during the lifetime of the organism, then the predictions of the model may be discounted.
[4 figures, 15 references] SW

9.12 LIFE BETWEEN TIDEMARKS ON ROCKY SHORES
(9.6)

Stephenson, T. A., and Anne Stephenson
Published by W. H. Freeman and Co., San Francisco, Calif. (1972), xii + 425 pp.

In the introductory chapter of the book, the terminology and the geographical features of tidal, rocky-shores are defined. The next five chapters cover shore organisms relative to physical limitations of cold, temperate, and tropical climates. The authors apparently had a wide knowledge of Bermuda since they covered its shorelands in a chapter devoted exclusively to that island. In one chapter, the shores of the south, central west, and central east coasts of Africa are described. Both coasts of North America are covered in two chapters; the coast of Chile is included in the chapter on the Pacific coast. Australian and New Zealand shorelines are included in one chapter on Australasia, and the last region described is the British Isles. Each chapter is concluded with a list of references. The book includes an index of authors, an index of genera and species, and a general subject index. SW

9.13 EFFECTS OF SUBLETHAL AMOUNTS OF CADMIUM AND MERCURY ON THE METABOLISM OF ZINC-65 BY FRESH WATER FISH

Merlini, Margaret, F. Argentesi, A. Brazzelli, B. Oregioni, and G. Pozzi (CCR, Ispra, Italy)
Chemical Abstracts 79, No. 5, 29006y (Aug. 6, 1973)

8.53 CHANGE OF THE FATTY ACID COMPOSITION OF CARP MUSCLE LIPIDS
(1.92) DURING VARIOUS METHODS OF TREATMENT

El-Bastavizi, Mohamed A., and G. A. Smirnova (Mosk. Inst. Nar. Khoz. im. Plakhanova, Moscow, U.S.S.R.)
Chemical Abstracts 78, No. 9, 56625k (Mar. 5, 1973)

9.10 CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS
(9.4)

Anonymous
Marine Research Committee, Dept. of Fish and Game, State of California (June 1, 1972), 150 pp. Inquiries concerning the report should be addressed to the State Fisheries Laboratory, California Dept. of Fish and Game, 350 Golden Shore, Long Beach, CA 90802.

The cooperating agencies for these investigations are: California Academy of Sciences; California Department of Fish and Game; Stanford University, Hopkins Marine Station; University of California, Scripps Institution of Oceanography; and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service. The report is organized into three sections. The first section consists of a review of the administrative and research activities during the period July 1970 to June 1971, a description of the fisheries, and a list of publications resulting from the program. The second section contains seven papers presented at the symposium, "Pollutants and Contaminants in the California Current System" held Nov. 1970. The third section consists of 13 papers dealing with the distribution of pollutants and contaminants in the marine environment, the processes controlling their distribution, and their effects on marine organisms. FTP

8.53 STEREOCHEMICAL STUDIES OF ACYCLIC ISOPRENOID COMPOUNDS. III. STEREOCHEMISTRY OF NATURALLY OCCURRING (MARINE) 2,6,10,14-TETRAMETHYLPENTADECANE

Cox, R. E., J. R. Maxwell, R. G. Ackman, and S. N. Hooper (Sch. Chem., Univ. Bristol, Bristol, England)
Chemical Abstracts 78, No. 5, 30023n (Feb. 5, 1973)

9.11 (1.22)(1.33) COHERENCE IN TRANSPACIFIC MOVEMENTS OF POSITIVE AND NEGATIVE ANOMALIES OF SEA SURFACE TEMPERATURE, 1953-60

Favorite, Felix (National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, WA 98112), and Douglas R. McLain (National Marine Fisheries Service, NOAA, c/o Fleet Numerical Weather Central, Monterey, CA 93940)
Nature 244, No. 5412, 139-143 (July 20, 1973)

Studies of the relationship between the oceanic distribution of fishes, such as the Pacific salmon, and their environment requires marshalling huge amounts of observations collected by independent research vessels and cooperating commercial vessels which have passed through the ocean area under investigation. The authors were charged by the American Section of the International North Pacific Fisheries Commission to summarize environmental investigations in the central part of the subarctic Pacific region (transpacific north of 40° N.) for 1960-72. Data before 1940, between 1940-47, and between 1948-67 were assembled and programmed for computer analyses. Monthly data between 1948 and 1967 are reasonably complete in 5° by 5° quadrangles; the anomalies used in this report are based on monthly and annual mean values for this 20-year period.

Sea surface temperatures in the subarctic Pacific region are quickly altered because of the succession of climatic changes. Charts of surface temperatures taken at 10-day or monthly intervals may show disordered variability. On the other hand, when approximately 2 million observations are analyzed by computer in 5° by 5° quadrangles, maximum, minimum, and anomalous temperatures are revealed in interesting patterns. Analyses of mean annual values of sea surface temperature between 1953 and 1960 showed an orderly west to east displacement of the maxima of the

9.11 DEEP-SEA SPECIES DIVERSITY: DECREASED GASTROPOD DIVERSITY AT ABYSSAL DEPTHS

Rex, Michael A. (Dept. of Biology, University of Massachusetts, Boston, MA 02116)
Science 181, No. 4104, 1051-1053 (Sept. 14, 1973)

The continental slope varies in depth between 200 and 2,000 m; the abyssal rise lies at depths between 2,000 and 4,000 m. The environments at these depths have been reported to support very diverse benthic communities. No studies have been reported on species diversity on the abyssal plain (below 4,000 m), the deepest and largest benthic region. To determine comparative gastropod diversity, samples were collected from 24 stations along a transect which varied in depth between 70 and 4,970 m. The total number of species collected was 136, distributed among 9,034 individuals. Only specimens taken alive were used in the comparison. The methods used to compare species diversity among the samples were those of: R. H. MacArthur [Amer. Natur. 102, 243 (1968)]; E. C. Pielou [An Introduction to Mathematical Ecology, Wiley, New York (1969)]; and S. H. Hurlbert [Ecology 52, 577 (1971)]. The diversity indexes of E. H. Simpson [Nature 163, 688 (1949)]; L. Brillouin [Science and Information Theory, Academic Press, New York (1962)]; R. P. McIntosh [Ecology 48, 392 (1967)]; and E. W. Fager [Amer. Natur. 106, 293 (1972)] were also applied. The density of organisms along the transect of the upper continental slope varied between 6,000 and 23,000 per square meter (m^2); it dropped to 1,500 to 3,000 per m^2 on the lower continental slope. The density decreased to 500 to 1,200 per m^2 on the abyssal rise and to 31 to 270 per m^2 on the abyssal plain. With the decrease in density with depth, there was no change in species diversity except for

9.12 (1.12)(1.9) FINAL REPORT OF THE WORKING PARTY ON TUNA AND BILLFISH TAGGING IN THE ATLANTIC AND ADJACENT SEAS

Anonymous
FAO Fisheries Reports, No. 118, Supplement 1, 37 pp. (Sept. 1972) (Rome, Italy)

Card A

The Working Party for tuna tagging in the Atlantic and adjacent seas was formed according to recommendations made during the second session of the FAO Expert Panel for the Facilitation of Tuna Research, in Tokyo, Aug. 15-21, 1966. The panel also recommended: work be confined to yellowfin, bluefin, and skipjack tuna, and albacore; research into the efficiency of different tags; the plastic tag of the Inter-American Tropical Tuna Commission be used as a standard for comparison.

At its third session in Cadiz, Spain, Oct. 7-10, 1969, the panel made the following recommendations: to include billfishes, to add total catch data in reports of tag returns, to perform additional research on more efficient tags, to set up guidelines for use of the most efficient tags; and to make uniform rewards for return of tags.

The Working Party prepared an interim report (Mather et al., 1969) which was published in the report of the Third Session of the panel (FAO Fish. Rep. No. 80, pp. 50-69). At the fourth session of the panel the Working Party was disbanded.

This final report is a review of tagging results up to Oct. 1971. Small bluefin had been tagged in large numbers. The recaptures of these tuna indicated several migration routes and areas of heavy exploitation. Large bluefin tuna had been tagged in more localities than the small ones. Migration routes between North

9.12 (1.12)(1.9) FINAL REPORT OF THE WORKING PARTY OF TUNA AND BILLFISH TAGGING IN THE ATLANTIC AND ADJACENT SEAS

Anonymous
FAO Fisheries Reports, No. 118, Supplement 1, 37 pp. (Sept. 1972) (Rome, Italy)

Card B

Cooperating sport fishermen have tagged 672 blue marlin in the northwest Atlantic from 1955 to 1971. Five were recaptured. The stocks of blue marlin have been declining due to heavy longline fishing, and they should be more closely observed by tagging. Sailfish have been tagged by sport fishermen in the western North Atlantic. The majority were captured near the release area. Some seasonal migration was observed.

Two types of tags are being investigated: the Floy FT-1 and the WHOI type "H." Information will be gathered relative to tagging various size fish from purse seine and longline catches. It is preferable to tag small tunas from hook and line catches and large ones fron net catches. Swordfish should be tagged swimming free.

A bibliography of tuna and billfish tagging and maps of migratory tendencies of both species are included. SW
[5 figures, 11 tables]

9.11

that on the abyssal plain. The diversity of organisms was found to be low on the continental shelf. A fairly uniform, high diversity then decreased with increasing distance out onto the abyssal plain. The author concluded that the data agree with other reports which attributed increased diversity below the continental shelf to increased environmental stability. Decreased diversity on the abyssal plain may result from low productivity.
[2 figures, 1 table, 19 references] SW

9.12 OPTIMAL FISH CRUISING SPEED

Weihs, D. (Dept. of Applied Mathematics and Theoretical Physics, University of Cambridge, Cambridge, England)
Nature 245, No. 5419, 48-50 (Sept. 7, 1973)

Various species of fish make long-range migrations for feeding and spawning purposes. Long distances in the migrations are covered without food intake, and efficient use of stored body energy would be beneficial to the fish. Using mathematical analysis, the author demonstrated that by regulating the swimming speed the performance and efficiency of the fish can be increased. Such information can be useful to fishermen in tracking and locating fish. The mathematical equations showed that, in terms of kinetic energy as a proportion of a given total energy store, the fish swim more efficiently if the speed through the water is maintained at about one fish length per second. The author concludes that the extent of a migratory route could depend upon the size and species of fish involved.
[1 figure, 15 references] SW

9.11 (1.22)(1.33)

temperature for this period beginning off the coast of Japan in 1955 and reaching the west coast of North America in 1957. The transpacific movement of a layer of warmer water generally advanced at a speed of 5 km/d. This continuity of oceanic conditions is confirmed by recent evidence that eddies breaking off from the Gulf Stream have maintained their integrity for several months and sometimes up to a year. The biological implications of being able to forecast the locations, in time and space, of such warm or cold areas in the ocean are many. Data on the sea temperature in the quadrangle off the Queen Charlotte Islands showed abnormally warm winter conditions which coincided with the 1953 and 1958 year-classes of herring. These fish overwhelmingly dominated the herring fishery of southeastern Alaska for 5 and 4 years, respectively.

The authors suggest that their data confirm the possibility of a high order of coherence in a generally turbulent oceanic regime. They hope that this information will stimulate support for acquiring additional oceanographic data to further elucidate conditions and processes in the North Pacific gyre.
[4 figures, 2 tables, 17 references] SW

9.12 (1.12)(1.9)

America and European coasts were found but identity of stocks in relation to migration routes was not found.

Tags recovered from albacore recaptures indicated a seasonal migration route northward along the west coast of Portugal to southwest of Ireland and then into the Bay of Biscay. There have been meager returns from yellowfin tuna tagging. Sustained tagging in the Gulf of Guinea is suggested for gaining information on this species. Blackfin tuna tagging between 1959 and 1961 indicated Cuban waters to be the location of recapture. A Cuban tagging program conducted in 1970 may yield more information. There have been no returns from 231 releases of bigeye tuna in various parts of the Atlantic Ocean.

After 4,000 releases and 90 returns between 1961 and 1970, very little is known about migrations or populations of skipjack tuna. The releases were made off the coasts of Cuba. No movement outside this area was found. None of the fish tagged in the Cape Cod-Cape Hatteras area were recaptured elsewhere.

Of 264 broadbill swordfish tagged in the Cape Hatteras-Grand Banks area in the years 1961-1971, 15 were recaptured in the same area. Over 8,400 white marlin had been tagged, and 103 returns were obtained. Most releases were made between Cape Hatteras and Cape Cod in the summer, and 89 returns were obtained. These returns indicated a migration at the end of the summer; marlin move toward midocean, then southward to a wintering area off the northern coast of South America.

Continued on Card B

9.15 SPAEROMYXA MAIYAI SP. N. (PROTOZOA: MYXOSPORIDEA), COELOZOIC PARASITE OF THE PACIFIC TOMCOD, MICROGADUS PROXIMUS

Morrison, N. Donald, and Ivan Pratt (Dept. of Zoology, Oregon State University, Corvallis, OR 97331)
Journal of Protozoology 20, No. 2, 214-217 (1973)

During the course of a survey of parasitic infections of offshore marine fish of Oregon, the authors noted that a large percentage of adult Pacific tomcod harbored a coelozoic myxosporidian of the genus Sphaeromyxa. This new species, Sphaeromyxa maiyai sp. n. (Myxosporidea: Myxiidae), obtained from the gall bladder of the fish, is described in this report.
[8 figures, 14 references]

FTP

9.15 EFFECT OF COPPER SULFATE ALGICIDE DOSES ON THE ENERGY METABOLISM OF COMMON CARP (CYPRINUS CARPIO) AND GOLDFISH (CARASSIUM AURATUS) (9.16)

Leonte, Eliza (Inst. Biol. 'Traian Savulescu', Bucharest, Romania)
Chemical Abstracts 79, No. 3, 14209c (July 23, 1973)

9.16 HYGIENE IN NEW ZEALAND TROUT HATCHERIES

Hewitt, G. C. (Zoology Dept., Victoria University, Wellington, New Zealand)
Fisheries Technical Report, No. 86, New Zealand Marine Dept., Wellington, New Zealand (1972), 12 pp.

The objective of this report is to help hatchery organizations reduce the possibilities of infections. Parasites are associated with all wild animal populations. Where animals are introduced into a new habitat without the majority of their parasites being introduced with them, mortalities will be low. Additionally, parasites which normally are relatively harmless may cause high mortality of the host under conditions of high temperature or salinity, lack of food or oxygen, and crowding. The most likely sources of initial infection in probable order of risk are (1) the introduction of diseased fish to the hatchery, (2) contamination of the water supply by diseased fish, birds, or snails, (3) disease carrying eggs, (4) contaminated equipment for handling fish and eggs, and (5) disease organisms carried into the hatchery on vehicles or footwear. To decrease the risk of initial infection all stock should be brought into the hatchery as eggs, water supplies should be from underground sources (clean, and free of other fish and snails), open ponds and raceways should be protected from fouling by birds, used equipment from other hatcheries should be prohibited, packages of eggs should be shipped between hatcheries in nonreturnable containers, water runoff into ponds should be prevented, and vehicles used for transportation of fish between hatcheries should be washed down with a 4% free-chlorine solution. In the course of an unavoidable infection, often there is a slow buildup in the stock over 2 or more years with a slow buildup of mortality; then a sudden mass mortality occurs when either a critical level in

9.16 GROWTH OF GREEN AND LOGGERHEAD SEA TURTLES IN GEORGIA ON NATURAL AND ARTIFICIAL DIETS

Stickney, Robert R., David B. White, and Daniel Perlmutter (Skidaway Institute of Oceanography, Savannah, GA 31406)
Bulletin of the Georgia Academy of Science 31, 37-44 (Jan. 1973)

Loggerhead sea turtles (Caretta caretta) occur in the coastal waters of Georgia. The green sea turtle (Chelonia mydas) is rare to this area but it has been found between latitudes 35° N. and 36° S. In the present tests, loggerhead sea turtles and green sea turtles were reared for several weeks following hatching on diets consisting of either commercial trout-feed pellets, frozen fish, a combination of pellets and frozen fish, or frozen ground crab scraps. An indoor running saltwater system was used for rearing the turtles. The results indicated that green sea turtles can be reared on commonly available pelleted feed at least through the first few months of life. Their growth was similar on all the diets except on that of the crab scraps, on which growth was poor. The loggerhead sea turtles showed poor growth on pellets as compared with their growth on other diets. Apparently, the loggerhead sea turtle needs a diet high in animal protein and other animal ingredients for proper nutrition. It is likely that lack of vitamins or minerals may have been a factor in the poor growth response of the loggerhead sea turtles. Also, the difference in growth responses between the two species may be related to the fact that the green sea turtle is herbivorous after the first year of life and the loggerhead sea turtle is strictly carnivorous.
[2 tables, 3 references]

FTP

9.16 TECHNIQUES AND INSTRUMENTATION TO CONTROL SOME ENVIRONMENTAL FACTORS FOR SHELLFISH NUTRITIONAL STUDIES

Dwivedy, Ramesh C. (University of Delaware)
Bulletin No. 403, College of Marine Studies, University of Delaware, Newark, DE 19711 (Sept. 1973), 29 pp. Price not given.

The purpose of this work was to develop techniques and instrumentation for feeding oysters under controlled environmental conditions. This bulletin describes the instrumentation for positive control over factors of light intensity, feed density, light to dark ratio, flow rate, and flow volume for nutritional studies of oysters in a recirculating system. The instrumentation and techniques are also adaptable for feeding studies of oysters using radioactive tracers to determine acceptance, rejection, and utilization levels of a given feed by the oyster. The authors indicate that the techniques and instrumentation, with slight modification, can be used to study the feeding of any shellfish.
[8 figures, 7 references]

FTP

9.16 THE USE OF ION SPECIFIC ELECTRODES FOR CHEMICAL MONITORING OF MARINE SYSTEMS. PART ONE. THE AMMONIA ELECTRODE AS A SENSITIVE WATER QUALITY INDICATOR PROBE FOR RECIRCULATING MARICULTURE SYSTEMS

Srna, Richard F., Charles Epifanio, Michael Hartman, Gary Pruder, and Ann Stubbs
Sea Grant Publication No. DEL-SG-14-73, College of Marine Studies, University of Delaware, Newark, DE 19711 (June 1973), 20 pp. Price not given.

A Sea Grant project at the University of Delaware involves the study of growing shellfish in a recirculating system. As part of the project, certain analytical techniques are being evaluated to determine their usefulness in mariculture. The present study concerned the evaluation of the ammonia ion specific electrode for use in monitoring water quality and biological activity in the recirculating water system used in mariculture. In order to assess the usefulness of the ammonia electrode for monitoring water quality, two recirculating systems and one flow-through system containing Delaware Bay water were tested. The researchers found that the ammonia electrode tested was precise and was easy to use for monitoring the ammonia level in a closed system. Furthermore, the ammonia level could be used as a master variable to detect rapid system changes involving physical and biological perturbations.
[4 figures, 4 tables, 4 references] FTP

9.16 COASTAL AQUACULTURE IN THE INDO-PACIFIC REGION

Pillay, T. V. R. (editor) (Dept. of Fisheries, FAO, Rome, Italy)
Published by Fishing News (Books) Ltd., 110 Fleet St., London EC4A 2JL, England. (1972), xiii + 497 pp. Price: £8.00.

This book is a collection of papers and abstracts of papers, presented at the Indo-Pacific Fisheries Council Symposium on Coastal Aquaculture held in Bangkok, Thailand, 18-21, November 1970. Based on a review of the papers presented, the editor suggests that seed production and preparation of inexpensive feeds are areas of aquaculture that need further development. Site selection, design of installations, indigenous species in culture, controlled breeding, and environmental problems were also considered to be important. The first section of the book deals with the status and problems of aquaculture in the countries and regions included in the designation Indo-Pacific. These are: Australia, Japan, Republic of Korea, Malaysia, the Philippines, Taiwan, Thailand, the United States, Vietnam, Eastern India, Ceylon, and Kerala State (southwest India). The second section covers the biology and taxonomy of some culturable species, including finfish and prawns. The third section includes papers on controlled breeding and egg production of fish, mollusks, and prawns. The fourth and fifth sections include the aquaculture techniques reported on shellfish and fin-fish. The sixth section on pests and predators consists of only one report. The seventh section covers selection of sites for aquaculture operations and methods of pond construction. The final section reports on economic trends of aquaculture in the Philippines. There are many photographs and graphs accompanying the text to illustrate the aquaculture techniques described in the discussion. The complete reports are followed by bibliographies. SW

9.15
(9.6) DISEASES OF FISHES

Van Duijn, C., Jr.
Published by Charles C. Thomas, Springfield, Ill., 3rd Edition (1973), 372 pp. Price not given.

This book is a review of the main causative agents of fish diseases and the drugs necessary for the treatment of the diseases. It may be used as a reference source by pond keepers, fish breeders, and those who maintain aquariums. The following subjects are covered: skin infections and parasites, diseases of the gills, sporozoan-caused diseases, viral and bacterial diseases, eye diseases, diseases of internal organs, tumors, other complaints, and medicines. Each chapter is followed with a bibliography, and there is a subject index. SW

9.16

the infection or environmental stress appears. To prevent disease buildup, stress in the fish population must be reduced by following good practices such as beginning with strong healthy parent fish, careful feeding, clean, well-oxygenated water supplies, and maintaining a proper balance between number of fish, water flow, water temperature, and oxygen content of the water. Larval stages and spores of parasites or infectious bacteria should be killed through periodic cleaning of ponds and raceways. Buildups of food wastes and feces must be avoided. Facilities should be resurfaced annually. Disinfection methods should be reasonably inexpensive and not contribute to poisoning the fish stocks. Cleansing of gear should be by dipping into a bucket of concentrated sodium chloride or potassium permanganate and then rinsing off in clear water. Steam cleaning of equipment can be effective only at temperatures between 115°-130° C. Scrubbing surfaces with a solution of at least 2% free chlorine is effective, but they must be rinsed off thoroughly before fish come into contact with them. Should serious disease strike a hatchery, eradication will be facilitated by keeping records of water quality, feeding, entry of new stock, and any other pertinent events.
[12 references] SW

9.15 SODIUM SALT (2,4-D) RELATED TO EMBRYO AND LARVAL DEVELOPMENT OF CARP (1.92)

Maciak, O. (Exp. Farm Lab. Water Biol., Pol. Acad. Sci., Golysz, Poland)
Chemical Abstracts 79, No. 7, 39108x (Aug. 20, 1973)

9.16 PRE-CONDITIONING PROCESS FOR INDUCED SPAWNING

Moe, Martin A., Jr. (Juno Isles, Fla.), and Jay P. Dunathan (Tequesta, Fla.); Oceanography Mariculture Industries Inc. (Riviera Beach, Fla.) (pat.)
U.S. Patent 3,741,158 (June 26, 1973)

This invention involves a process for the preconditioning of fish in preparation for induced spawning. Brood stock of fish (for example, pompano) from the natural environment is isolated in a controlled environment where water quality, temperature, and light are selectively controlled. By maintaining and ajusting the proper environmental conditions the spawning capability and sexual maturity of the fish are controlled. The process is of interest in aquaculture or fish farming operations as a means of stabilizing fish farming output or for controlling the timing of maximum production with optimum marketing conditions. FTP

9.16 FISH HUSBANDRY SYSTEM

Buss, Keen W., and Richard E. Speece; Marine Protein Corp. (New York, N.Y.) (pat.)
U.S. Patent 3,756,197 (Sept. 4, 1973)

This invention describes a high intensity system for raising of fish in one or more series-connected tanks. FTP

9.16 THERAPEUTIC AND TOXIC DOSES OF SOME CHEMICALS USED
(9.15) IN THE TREATMENT OF FISH DISEASES IN AQUARIA

Bootsma, R., and D. J. Kool (Afd. Ziektekd. Bijzondere Dieren, Fac. Diergeneeskd., Utrecht, Netherlands)
Chemical Abstracts 79, No. 7, 38474b (Aug. 20, 1973)

9.16 ROCK OYSTER SPAT CATCHING PROGRAMME 1971-72
(1.81)

Curtin, L.
Fisheries Technical Report No. 110, New Zealand Ministry of Agriculture and Fisheries, Wellington, New Zealand (1973), 48 pp.

Sticks made of various materials were set out in an estuarine area to determine which would be most suitable as oyster spat collectors. The size of tarred hardwood sticks was 183 cm × 2.5 cm × 2.5 cm; that of asbestos cement sticks was 122 cm × 5 cm × 0.65 cm; and that of reinforced concrete sticks was 122 cm × 2.5 cm × 2.5 cm. The sticks were assembled into racks and set out in the Huawai Bay-Mahurangi River area. The results indicate that all the sticks received satisfactory settlement of oyster spat. In experiments to determine the best rack configuration, one type had 8 layers of 4 sticks and the other had 10 layers of 3 sticks. All racks were 30 cm wide, and the sticks were of asbestos cement. They were then set out in the water for trials. The racks of the second configuration were found to have the most spat settlement. These racks also remained clean of debris. In another experiment, 90 asbestos cement sticks were set out each week from September 1971 to March 1972 to test settlement of spat through the spring and summer (of the antipodes). The results indicated that the sticks set out in the period mid-December to mid-January (summer) received the maximum spat fall. Sticks set out earlier were encrusted by species of Membranipora and Waltersipora (tufted mosslike colonies) which appeared to inhibit oyster spat settlement. Sticks set out in February and March received low densities of spat settlement. Sticks made of various materials were tested for suitability as spat collectors. The following materials

9.17 VULNERABILITY AND SURVIVAL OF YOUNG CONNECTICUT RIVER FISH
(1.92) ENTRAINED AT A NUCLEAR POWER PLANT

Marcy, Barton C., Jr. (Essex Marine Laboratory, Essex, CT 06426)
Journal of the Fisheries Research Board of Canada 30, No. 8, 1195-1203 (Aug. 1973)

This report is a result of the Connecticut River Ecological Study performed by the Connecticut Yankee Atomic Power Company in fulfillment of the construction permit granted by the State. Samples of fish and fish larvae were collected at stations located at various points along the discharge canal of the plant and the river. Observations of the samples that were collected indicated most of the fish and larvae that passed through the cooling water system of the power plant were dead by the time they reached the end of the discharge canal. During June and July, when the nonscreenable fish were abundant near the intake of the cooling system, about 80% of the mortality in the canal resulted from mechanically caused injury. About 20% of the mortality was attributed to heat shock and exposure to temperatures above 28° C. The use of sodium hypochlorite as a biocide in the system did not increase mortality. Of the numbers of nonscreenable living fish passing by the plant intake in the river, only about 4% (average) were entrained into the cooling system network. Natural mortality is high in prolific species. For example, the survival rate from egg to adult stages for the American shad in the Connecticut River is estimated to be 0.001%. Entrainment deaths add to the total rate of natural mortality. Screening out eggs and larvae to prevent entrainment would be of no benefit; a report of other work indicated that impingement of striped bass eggs and larvae on fine mesh screening was fatal. A precise evaluation of the impact of entrainment of 4% on the ultimate population of adult fish

9.16 (1.81)

were satisfactory in descending order: tarred hardwood, hardboard "A," acrylonitrile butadiene styrene, hardboard "B," aluminum, and polyvinyl chloride.

The tests were standardized by erecting the racks at three levels intertidally; bunches of sticks were set out in the same manner for comparison. In determining the effectiveness of spat settlement, counts of the subsequently hatched young oysters were made with the unaided eye after lightly scrubbing the sticks. The report contains many photographs of the racks set out in tidal flats and illustrations of sticks covered with oysters at various stages of growth.
[53 plates, 13 tables] SW

9.16 HYDROCHEMICAL CONDITION OF PRODUCTION AND FRY PONDS

Fridman, A. Kh., and E. V. Kozhokaru (U.S.S.R.)
Chemical Abstracts 78, No. 20, 128313g (May 21, 1973)

9.17 VORSCHLÄGE ZUM SCHUTZ DER FISCHEREI BEIM GEWÄSSERAUSBAU
[SUGGESTIONS FOR THE PROTECTION OF FISHERIES DURING THE REGULATIONS OF THE WATERS (DURING STREAM CONTROL)]

Elster, Hans-Joachim (Konstanz-Egg), D. Patrik Huber (Düsseldorf), Edmund Rehbronn (Starnberg), and Otto-Karl Trahms (Düsseldorf) (Arbeitsgemeinschaft der Deutschen Fischereiverwaltungsbeamten und Fischereiwissenschaftler)
Archiv für Fischereiwissenschaft 24, No. 1, 1-28 (Mar. 1973) [In German; Preface in English]

9.17 (1.92)

is not possible until more information is available on (1) the natural mortality of the life stages of the various species, (2) the capacity of the river environment to support fish populations, and (3) the proportion of the entire population of each species that are subject to entrainment.
[2 figures, 4 tables, 13 references] SW

9.16 (1.81) CONSTRUCTION AND REHABILITATION OF COMMERCIAL OYSTER REEFS IN FLORIDA FROM 1949 THROUGH 1971 WITH EMPHASIS ON ECONOMIC IMPACT IN FRANKLIN COUNTY

Whitfield, William K., Jr.
Special Scientific Report No. 38, Marine Research Laboratory, Florida Dept. of Natural Resources, St. Petersburg, Fla. (Apr. 1973), 42 pp. Price not given.

Increased demand for oysters has led to overexploitation and depletion of many natural oysters beds, and there has been a substantial decline in oyster production. Workers in the oyster industry have turned toward rehabilitation of natural oyster bars and the building of new ones to increase production. A project supported by the Federal and State governments was undertaken to construct and rehabilitate oyster reefs in Florida. Areas suitable for reef construction were selected on the basis of water quality, hydrography, physiography, and biological considerations. Over 4.2 million bushels of oyster shell and other cultch materials have been planted in 10 counties since 1949. Planting costs were 9.5 cents per bushel, and the unamortized planting expenditures were less than 1% of the estimated value of the oysters expected to be produced from these reefs over a 20-year period. The cultch was planted by blowing shell off the sides of a stationary barge with high-pressure water streams. Oysters of legal size were observed 6 months after planting the cultch material. The final retail value of oysters produced in Franklin County accounted for about 48% of the total personal income there. About 46% of the people employed in the county worked in the oyster industry.
[36 figures, 6 tables, 22 references] SW

9.16 DOES THE ADDITION OF TRIAZINE TO FISH PONDS CHANGE THE WATER QUALITY?

Johannes, H., and D. Luedemann (Ciba-Geigy A.-G., Frankfurt/M., Germany)
Chemical Abstracts 78, No. 24, 151495b (June 18, 1973)

9.16 RETENTION OF HERBICIDES IN WATER, SLUDGE, AND FISH AFTER APPLICATION IN FISH PONDS

Mayer-Bode, H. (Pharmakol. Inst., Rheinisch Friedrisch Wilhelms-Univ., Bonn, Germany)
Chemical Abstracts 79, No. 2, 9528s (July 16, 1973)

...OLOGY EXPERIMENT...

9.17

AN INVESTIGATION OF PROPAGATION AND THE MINERAL NUTRITION OF SPARTINA ALTERNIFLORA

Broome, Stephen W. (Dept. of Soil Science, North Carolina State University, Raleigh, NC 27607), William W. Woodhouse, and Ernest D. Seneca
Sea Grant Publication UNC-SG-73-14, North Carolina State University, Raleigh, NC 27607 (July 1973), 122 pp.

S. alterniflora is the dominant plant of the intertidal zone of bays and estuaries of the east coast of the United States; it produces a large amount of the food energy utilized by certain fauna and it helps the transfer of mineral nutrients from the sediments to surrounding waters. It is also useful in retarding erosion of shorelines and in trapping sediments and increasing the elevation. Thus, S. alterniflora salt marshes are a valuable natural resource; nevertheless, many acres of the plant have been destroyed by man's activities. Therefore, creating new salt marshes by cultivating S. alterniflora would be desirable. This publication is a report of a study of the effect of source of seed and storage treatments on viability of seed of S. alterniflora and the performance of seed planted in suitable habitats in North Carolina estuaries.

Results of the study suggest that seed should be collected from vigorous stands of the plant and stored over winter submerged in estuarine or sea water at temperatures between 2°-3° C.

Application of fertilizer increased the growth of S. alterniflora. The standing crop of above-ground shoots growing on sand was increased by addition of nitrogen alone and increased threefold when phosphorus was also supplied. Nitrogen

9.17
(9.6)

MARINE ECOLOGY: A COMPREHENSIVE INTEGRATED TREATISE ON LIFE IN OCEANS AND COASTAL WATERS. VOLUME I: ENVIRONMENTAL FACTORS. PART 2

Kinne, Otto (editor)
Published by Wiley-Interscience, London (1971), ix + pp. 683-1244. Price $32.00.
Malcolm S. Gordon (Dept. of Biology and Institute of Evolutionary and Environmental Biology, University of California, Los Angeles, CA 90024) (reviewer)
Transactions of the American Fisheries Society 102, No. 2, 503-504 (Apr. 1973)

Part 2 contains three chapters on salinity, water movement, and turbidity. The chapter on salinity comprises 71% of the book subdivided as follows: general introduction, bacteria and other microorganisms, plants, invertebrates, fishes, and bibliography. The reviewer suggests that the chapters on water movement and turbidity are interesting but limited in value. The chapter on salinity was reviewed with mixed reactions. In the section on bacteria, fungi, and blue-green algae, the effects of human activities, such as pollution, on these organisms are not mentioned. The plant section deals mainly with algae but ignores mangroves. Information on marine plants in the tropics is sparse. The section on invertebrates is based on earlier reviews by the editor and is generally satisfactory and useful. SW

9.17

PROCEEDINGS 2ND ANNUAL TECHNICAL CONFERENCE ON ESTUARIES OF THE PACIFIC NORTHWEST

Engineering Experiment Station Circular No. 44, Oregon State University, Corvallis, Oreg. (1972), 111 pp. Price $4.00

The purpose of this conference, held Mar. 16-17, 1972, was to help increase the understanding, intelligent planning, and management of our estuarine environment. These proceedings consist of 13 papers relevant to the estuaries of the Pacific Northwest. The papers deal with the social responsibility for the management of estuaries, physical properties of estuaries, description of the estuarine ecosystems, laws and regulations, and coastal zone management. FTP

9.17
(1.3)(1.25)
(1.26)

1972 ADDENDUM TO COLUMBIA RIVER FISH RUNS AND COMMERCIAL FISHERIES, 1938-70

Gunsolus, Robert T. (Fish Commission of Oregon), and Henry Wendler (Washington Dept. of Fisheries) (editors)
Joint Investigational Report Fish Commission of Oregon and Washington Dept. of Fisheries Volume 1, No. 3, 44 pp. (Jan. 1973)

This report and previous reports summarize information regarding fish runs and commercial fisheries of the Columbia River since 1938. Landings of salmon and steelhead are given by season. Other species are reported on an annual basis. Since 1940 the number of salmonids entering the Columbia River have declined; however, some populations have been unchanged or increased. Over 1.6 million salmon and steelhead returned to the river in 1972. About 579,000 were taken commercially; of this number, 142,200 fish were caught by the Indian fishery. The commercial catch was mainly fall chinook and coho salmon. The fall chinook run was small compared to fall runs of the last decade. The spring chinook run was the largest on record. The summer steelhead run was the third largest since 1955. The sockeye summer run was average. Small runs of summer chinook and chum occurred again.

The shad season was limited to June 26 and June 29-July 7 below Bonneville Dam. About 122,800 lb of shad were landed during the season. Shad landed in other seasons increased the total to 225,700 lb. A substantial population of shad spawns below the dam. Smelt landings were the best since 1959. The total was 1.6 million lb; about 303,500 lb were caught in the Columbia River. The Cowlitz

9.17 (9.12) COOPERATIVE GULF OF MEXICO ESTUARINE INVENTORY AND STUDY, MISSISSIPPI

Christmas, J. Y. (Gulf Coast Research Laboratory, Ocean Springs, Miss.) (editor)
Published by State of Mississippi Gulf Coast Research Laboratory, Ocean Springs, Miss. (1973), 434 pp.

This study of the Mississippi State Gulf coast is divided into four phases: "Area Description," "Hydrology," "Sedimentology," and "Biology." Information for the phase on biology was obtained by standard sampling procedures in which plankton and other organisms taken by seine and trawl were collected. In the plankton samples, ctenophores (comb jellies and sea walnuts) and copepods (small crustaceans) comprised the greatest number of species found. Vertebrate and invertebrate species that were collected varied in distribution by season and area relative to physico-chemical conditions. The report includes the occurrence, abundance, distribution, distribution influenced by temperature and salinity, spawning, and growth rate of fishes collected in samples taken from the estuarine study area. Of the 251 species observed in this area, the bay anchovy, manhaden, Atlantic croaker, spot, butterfish, and sand sea trout made up 93% of the fishes collected. There were other vertebrates in the samples taken. The bay anchovy was not fished by commercial fishermen. The other five most abundant species taken in the samples of the area contributed about 93% of the total commercial finfish landings in Mississippi. There are many tables in the report listing the names and abundance of zooplankton, fish, shrimp, mollusks, reptiles, birds, and mammals. There is a large section describing the marshes of the area and the flora they contain. The threat of dredge and fill operations is also discussed. SW

9.17 (1.3)(1.25)(1.26)

River run had a catch of 1.3 million lb taken in January and early March. The 1972 smelt run was above average. Sturgeon are taken during all commercial fishing seasons. About 305,700 lb of white sturgeon were landed which is comparable to the 1971 catch of 311,500 lb. Green sturgeon landings of 44,800 lb were below the 10-year average.

There are 30 tables in this report which summarize the statistics of the fish runs and the commercial fishery in 1972. SW

9.17 NATURAL ECOSYSTEMS (9.6)

Clapham, W. B., Jr. (Case-Western Reserve University, Cleveland, Ohio)
Macmillan Co., New York (1973), 248 pp. Price $3.95, paperback.

This book begins with an overview of the basic components of an ecosystem and their significant characteristics. An outline of the interactions between components of the ecosystem are presented in relation to the cycle of the energy (heat, light, tides) and resources that maintains them. Population and community dynamics are described. Aspects of the environment are related to aquatic and terrestrial ecosystems. The adaptability of an ecosystem to changes in its environment, either natural or manmade, tests its fitness to survive. In covering this subject, the author discusses the future of ecosystems in response to a perturbation such as climate change. SW

9.17

fertilizer doubled the standing crop of short S. alterniflora growing on finer textured sediment, but there was no response to phosphorus. No growth response was obtained from application of iron fertilizer.

Because nitrogen and phosphorus are limiting in the growth of S. alterniflora in some salt marshes, it is possible that the marsh may act as a buffer for the estuarine system providing a sink for excess nutrients which may come from municipal wastes and land runoff. Excess nutrients in the marsh would produce increased growth of S. alterniflora; the plant would then provide an increased supply of food energy and nutrients to the detritus food chain of the estuary. The ability of the salt marsh to utilize nitrogen and phosphorus may be helpful in managing estuarine systems, because the disposal of wastes high in nutrients (such as sewage effluent) may be less disruptive to the estuarine ecosystem if dumped in the salt marsh rather than in the open water. However, information is yet needed on the exact nature of the nutrient cycle in the marsh-estuarine system and the capacity of the marsh to receive excess nutrients.
[15 figures, 24 tables, 46 references, appendix with 26 tables] FTP

9.17 (9.6) MARINE ECOLOGY: A COMPREHENSIVE INTEGRATED TREATISE ON LIFE IN OCEANS AND COASTAL WATERS. VOLUME I: ENVIRONMENTAL FACTORS. PART 3

Kinne, Otto (editor)
Published by Wiley-Interscience, London, New York, Sydney, Toronto (1972), xiii + pp. 1246-1774. Price $34.00.
John Teal (reviewer) (Woods Hole, Oceanographic Institution, Woods Hole, MA 02543)
Transactions of the American Fisheries Society 102, No. 2, 504-505 (Apr. 1973)

Part 3 containing contributions by 17 authors covers the following subjects: substratum, pressure, dissolved gases, organic substances, ionizing radiation, and factor combinations in the sea. The reviewer believes that the value of the book is that of a quick reference for an overall review of the field of marine ecology. SW

9.17
(1.6) HUMAN BEHAVIOR ASPECTS OF FISH AND WILDLIFE CONSERVATION

Potter, Dale R., Kathryn M. Sharpe, and John C. Hendee (compilers)
U.S. Dept. of Agriculture, Forest Service General Technical Report PNW-4 (1973), 288 pp. Price not given. Pacific Northwest Forest and Range Experiment Station, U.S. Forest Service, Portland, Oregon.

This annotated bibliography was compiled to aid students, teachers, researchers, conservationists, and managers seeking literature on nonbiological or human behavior aspects of fish and wildlife conservation. The articles are listed with abstracts. The sources of most of the articles are scientific, trade, and conservation journals; outdoor magazines; conference proceedings; state conservation department periodicals; and federal-state-university-foundation sponsored reports. An author index is included. SW

9.19 METALS -- FROM PRIVATION TO POLLUTION

Ulmer, David D. (Harvard Medical School, Boston, MA 02115)
Federation Proceedings 32, No. 7, 1758-1762 (July 1973)

This report was presented at the 56th Annual Meeting of the Federation of American Societies for Experimental Biology, in the American Society of Biological Chemists Symposium on "Man and His Environment," held at Atlantic City, N.J., Apr. 10, 1972. The author suggests that the hazards of metal pollution should be placed in proper context with the following considerations: (1) metals occur in nature but their distribution has been altered by man, (2) limitations of analytical chemistry currently hinder accurate estimates of some metals in the environment, (3) many metals have normal biological functions in contrast to the effects of their excess in living systems, (4) description of normal biological function of metals is required for evaluation of manifestations of deficiency, intoxication, or imbalance, and (5) known risks must be distinguished from erroneous speculations on metal hazards.

Metals are found normally in the earth, water, and air in concentrations that vary widely in different areas. The current concern is the redistribution of metals in the industrial society such as the increased concentrations of mercury in water and air from chemical waste and coal burning.

Current analytical techniques are inadequate for the determination of some metals in biological systems. Determining the low "natural" concentration of mercury or lead in blood is still difficult, the author suggests.

Metals differ from other pollutants in that they have essential biological functions, and they also can be toxic if ingested excessively. Often the biological

9.19 MERCURY CONCENTRATIONS IN DATED VARVED MARINE SEDIMENTS COLLECTED OFF SOUTHERN CALIFORNIA

Young, David R., and Joseph N. Johnson (Southern California Coastal Water Research Project, El Segundo, Calif.), Andrew Soutar, and John D. Isaacs (Scripps Institution of Oceanography, La Jolla, Calif.)
Nature 244, No. 5414, 273-275 (Aug. 3, 1973)

The purpose of this work was to obtain data on historic levels of mercury in the marine environment distant from specific inputs (such as waste water outfalls). Data are reported on mercury concentrations in dated varved sediment layers from the Santa Barbara Basin covering the past 150 years and in two layers estimated to have been deposited about 1,500 years BP. The basin is about 100 miles northwest of Los Angeles, and it appears to be sufficiently removed from populated areas to be free of concentrated effects of localized pollutant inputs. Core sampling techniques were used to obtain samples representative of different time scales. The samples were analyzed by neutron activation analysis and by flameless atomic absorption spectrometry.

The levels of mercury in the varved sediments of the basin showed a distinct increase toward the surface. The baseline value for the 19th century was about 0.06±0.01 mg mercury per dry kilogram of sediment, with the levels beginning to exceed this significantly some time around the turn of the century. There seemed to be a somewhat lower baseline for the older sediments. The average level for the layers deposited after 1950 exceeded the estimated 19th century baseline value by a factor of about two. A review of other published data seems to indicate that during the past 100 to 150 years human activities have resulted in a rather similar

9.19 THE EFFECTS OF PESTICIDES ON WILDLIFE EXPOSURE AND RESIDUES

Moriarty, F. (Monks Wood Experimental Station, Abbots Ripton, Huntingdon, Great Britain)
Science of the Total Environment 1, No. 3, 267-288 (Nov. 1972)

Errors in the analysis of a wildlife sample for organochlorine insecticides are relatively small; single determinations should be correct within a factor of two, unless there is a bias. Variation in level of pesticides in animals is large, there is a skew distribution, and there is a risk of biased selection for samples.

The amounts of pesticides in wildlife are measured for two primary reasons: to decide whether the wildlife species are endangered by the pesticide and to survey the environment for possible pollution by the pesticide.

The relationship between exposure and amounts in animals, consistent with a mammillary model, can be made from the following deductions: (1) the concentration of the pesticide in a tissue depends upon the rate of intake in the food, (2) the level of a pesticide in a tissue approaches an upper limit if there is a constant rate of intake, (3) the concentrations of pesticide in different tissues are correlated, and (4) when exposure to the pesticide ends, the level in the tissues decreases. If exposure to the pesticide is intermittent, the amount in the animal will depend upon the time since its last exposure. If stable plateaus are not maintained, the level of the pesticide in animals may decline with time regardless of whether the amount of exposure to the pesticide is increasing, stationary, or decreasing. Transition from sublethal to lethal levels can occur

9.19

pattern of increased mercury introduction to several reservoirs in the northern hemisphere. The anthropogenic input rate of mercury to the southern California coastal marine reservoir seems to have matched the natural input rate in recent years.

An alternative explanation offered by the authors is that mercury is relatively mobile in the interior of anaerobic sediments and that it is continuously being concentrated in the newly deposited and less anaerobic sediment of the surface layer. The chemistry and mobility of mercury in these marine sediments are yet too poorly understood to exclude this possibility. It seems, therefore, that man recently has increased, on a regional scale, the level of mercury in the southern California marine ecosystem by a factor of about 2.
[1 figure, 11 references]

FTP

9.19 COMPOSITION OF WASTE WATERS OF FISH-PROCESSING INDUSTRIES.

Pesenson, I. B., E. V. Porkhal, A. P. Baranova, and A. N. Zabbarov (U.S.S.R.)
Chemical Abstracts 78, No. 22, 140156r (June 4, 1973)

9.19

rapidly (because fat reserves may be mobilized) when the level of the pesticide in the tissues changes abruptly.

The author states that it is unlikely that predators accumulate the insecticide contained in their prey. Aquatic predators acquire their insecticide directly from the water, not from their food. In terrestrial food chains, like should be compared with like; if terrestrial predators have higher levels of pesticide than their prey, it probably indicates a difference in metabolic and excretory rates or selection by the predator of the more contaminated individuals from their prey species.

Pesticide residues in an animal show that it has been exposed to that pesticide; however, much more information is needed before quantitative deductions can be made from such data about levels of the pesticide in the environment.
[5 figures, 5 tables, 93 references]

FTP

9.17 THE ECONOMICS OF OVEREXPLOITATION
(9.2)(9.3)

Clark, Colin W. (University of British Columbia, Vancouver 8, British Columbia, Canada)
Science 181, No. 4100, 630-634 (Aug. 17, 1973)

Renewable resources possess self-regeneration capacities which can either be conserved for continual use or destroyed by over use. Environmental pollution often is a result of overexploitation of the regenerative capacity of the atmospheric and water resources. Economists believe that the leading economic cause of pollution is that it is not normally accounted for in the cost-revenue analysis of producers. Biological resources are also subject to overexploitation. This has been observed in the accelerating decline of many important fisheries in recent years. The need for effective international regulation of fisheries is pressing. The economic analysis of a biological resource such as the blue whale suggests that overexploitation (reduced productivity) may result from two social conditions: common property competitive exploitation and private property maximization of profits. For whales, which are economically valuable but possess low reproductive capacity, either condition could lead to extinction of the population. The author described a simple mathematical model to prove his points that a corporate owner of property rights in a biological resource might prefer extermination to conservation on the basis of maximization of profits and that this is a definite possibility under private management of such renewable resources.
[6 figures, 24 references]

SW

9.19

interest in a metal begins with its toxicity; later, the essential biological function of the metal is discerned. The author suggests that the problem of pollution is not to establish whether or not a metal has toxic properties, but rather at what concentrations it shows responses of deficiency, essential functions, imbalance, pharmacological action, or toxicity.

Presently available data does not permit an accurate assessment of the ecological threat posed by metals in the environment. To acquire these data the author suggests: a systematic study of long-term trends in the redistribution of metals in the environment and their rate of buildup, expansion of investigations of the effects of metals on biological systems, and development of more sensitive signals of toxicity. In support of these efforts, more rapid, sensitive, and accurate analytical methods for metal determinations must be developed.
[1 figure, 7 tables, 11 references]

SW

9.19 SAFETY QUOTIENT AS A CRITERION FOR JUDGING THE TOXICITY OF HERBICIDES TO FISH

Neuhuber, H. (Bundesanst. Pflanzenschutz, Vienna, Austria)
Chemical Abstracts 78, No. 23, 144120x (June 11, 1973)

9.19 (1.951)(1.0146) MERCURY AND OTHER METALS IN BRITISH SEALS

Heppleston, P. B. (Seals Research Division, Institute for Marine Environmental Research, c/o Fisheries Laboratory, Lowestoft, Suffolk, England), and M. C. French
Nature 243, No. 5405, 302-304 (June 1, 1973)

Concern about pollution has caused investigations to be conducted into the distribution of heavy metals in the environment and in living forms. To add to the information about take up of heavy metals in seals, the authors have analyzed the tissues of 96 seals inhabiting 6 sites around Britain and present preliminary results in this article. The seals were either the common seal Phoca vitulina or the gray seal Halichoerus grypus.

The results indicate that there were regional variations in mercury concentrations in the brain; the brains of seals from the Outer Hebrides and Farne Islands had higher concentrations of mercury than the brains from seals taken from the other sites. In addition, concentrations of mercury in the brain did not increase with the age of the seals. However, the concentrations of mercury in the liver correlated positively with the age of the seals. Cadmium was found in relatively large quantities (22 p.p.m. wet weight) in all kidneys; the concentrations tending to increase with age. Brains and livers contained less than 1 p.p.m. of cadmium. Lead, zinc, and chromium were found in molar teeth, with cadmium and copper in lesser quantities. There was a progressive decrease in concentrations of lead, cadmium, and chromium in teeth in relation to age; young seals had higher

9.19 INSECTICIDES, POLYCHLORINATED BIPHENYLS AND MERCURY IN WILD CORMORANTS, PELICANS, THEIR EGGS, FOOD AND ENVIRONMENT

Greichus, Yvonne, A. Greichus, and J. R. Emerick (South Dakota State University, Brookings, SD 57006)
Bulletin of Environmental Contamination and Toxicology 9, No. 6, 321-328 (June 1973)

Earlier reports indicated that organochlorine insecticides, polychlorinated biphenyls (PCBs), and mercury which are present in the environment also are present in the food chain of fish and accumulate in the tissues of fish-eating birds. The authors determined the levels of these pollutants in the sediments and water of two lakes in South Dakota and in the birds and fish of the lakes to find out whether biological concentration had occurred.

The concentration of organochlorine insecticides in the bottom sediments was found to be 7-fold greater than in the water; the concentration of these insecticides in fish was found to be 10-fold to 60-fold greater than in the bottom sediments. The concentration of PCBs in fish were found to be 12-fold greater than in bottom sediments, and the levels of PCBs in the fish and in the bottom sediments were higher than those of the insecticides. Mercury was not found in water, bottom sediments, or fish except carp which had the highest levels of insecticides and PCBs.

Other results indicate that adult cormorants and pelicans had, respectively, 250-fold and 280-fold greater levels of insecticides than fish. The concentration of PCBs in the bodies of cormorants and pelicans were, respectively, 60-fold and 30-fold greater than in fish. Insecticide and PCB levels in cormorant eggs corresponded to the body levels that were found in the adult birds and were higher than

9.19 WATER QUALITY CRITERIA FOR EUROPEAN FRESHWATER FISH. REPORT ON AMMONIA AND INLAND FISHERIES

Prepared by the European Inland Fisheries Advisory Commission Working Party on Water Quality Criteria for European Freshwater Fish
Water Research 7, No. 7, 1011-1022 (July 1973)

The effect of ammonia is an important factor in establishing water quality criteria for European freshwater fish. Common sources of ammonia in water are sewage effluent and effluents from certain industries and from agriculture. The toxicity of ammonia to fish is related to the pH value and the temperature of the water, which factors govern the concentration of un-ionized ammonia present--only the un-ionized fraction of ammonia is poisonous. The level of the un-ionized fraction increases with rising pH and rising temperature.

Depending upon the species, fish differ only slightly in their tolerance to ammonia; this difference is more significant for short periods of exposure. Nevertheless, the difference in tolerance is not large enough to justify different quality criteria for different species of freshwater fish.

The lowest toxic level of ammonia (un-ionized) for salmonids is 0.2 mg NH_3 per l^{-1}; however, other adverse effects resulting from prolonged exposure are only absent at levels less than 0.025 mg NH_3 (un-ionized) per l^{-1}. Concentrations of total ammonia in the water that contain 0.025 mg NH_3/l^{-1} (un-ionized) vary from 19.6 mg/l^{-1} (pH 7.0, 5° C) to 0.12 mg/l^{-1} (pH 8.5, 30° C). The report states that the criterion should not be applied to temperatures below 5° C or to pH values above 8.5 when other factors have to be taken into consideration.
[2 figures, 2 tables, 51 references]

FTP

9.19 GENETIC RESISTANCE TO DDT IN THE JAPANESE QUAIL COTURNIX COTURNIX JAPONICA

Poonacha, K. B., B. C. Wentworth, and A. B. Chapman (Depts. of Poultry Science and Genetics, University of Wisconsin, Madison, WI 53706)
Poultry Science 52, No. 3, 841-846 (May 1973)

The purpose of this study was to find out whether the Japanese quail could develop a resistance to DDT. The experiments were designed so that the effects of environmental stress on the resistance of birds selected for resistance to DDT could also be determined. These selection studies of resistance to DDT involved eight generations of Japanese quail--two selected lines and one control line. One selected line of quails differed from the other selected line in that, besides mass selection, the birds were chosen on the basis of family merit. The selected lines of quail were fed 200 p/m of DDT during their first 30 days of life. Part of the control lines were also fed DDT (to test for resistance), and the mortality of the control group was compared to the mortality of the selected lines.

The Japanese quail started to develop resistance to DDT after the third generation of selection. When the DDT-fed resistant lines and the control group of quail were exposed to partial starvation and cooler temperatures, the selected lines had lower mortality than the control line fed DDT. Among the resistant lines of quail, the females were less resistant than the males. The DDT resistant lines also showed some cross-resistance to lindane (another hydrochlorinated pesticide). The authors conclude that a DDT-resistant strain of Japanese quail can be developed out of the less resistant population by selection.
[1 figure, 4 tables, 28 references]

FTP

9.19 [THE SERIOUS THREAT TO THE MARINE ENVIRONMENT]
(9.6) HAVSMILJÖN ALLVARLIGT HOTAD

Dybern, B. I. (Inst. Mar. Res., S-453 00 Lysekil, Sweden)
Medd. Havsfiskelab., Lysekil, Sweden (1972), 122 pp.
Aquatic Sciences & Fisheries Abstracts 3, No. 2, 182-183, Abstract No. 3Q1844M (Feb. 1973)

A pollutant is a substance which is discharged into the sea by man and is harmful to the ecosystem. The result may be reduced production of seafood, the contamination of seafood, and interference with commercial fishing and recreational use of the sea. Many thousands of pollutants have been discharged into particularly sensitive areas of the sea such as the light penetrated surface zone where primary production of organisms takes place. The pollutants are discharged into the sea by rivers, via the air, and from dumping by ships. The sea disperses the pollutants by diffusion, turbulence, and currents. Organic nutrient substances containing phosphorus and nitrogen contribute to eutrophy and may take oxygen from the sea. Bacteria and viruses accompany an unhygienic condition. Industrial compounds and pesticides add toxic qualities to the sea. Persistent compounds accumulate and remain to poison generations of organisms. More research is required to determine how much the environment and ecosystems can tolerate. Legislation based on facts developed by the research should be enacted to control pollution. International cooperation should be instituted for global pollution problems. SW

9.19 WINTER-SPRING SPORT FISHERY IN THE HEATED DISCHARGE OF A
(1.92) NUCLEAR POWER PLANT

Marcy, B. C., Jr., and R. C. Galvin (Essex Marine Laboratory, Essex, CT 06426)
Journal of Fish Biology 5, No. 4, 541-547 (July 1973)

A substantial winter-spring sport fishery has developed in the heated discharge canal of the Connecticut Yankee Atomic Power Company on the Connecticut River. Fishermen using the canal in the cooler months were able to catch twice as many fish per unit effort as those fishing the Haddam area from April to November. These anglers caught 10 times more fish than fishermen 141 km upstream. A correlation was found between the water temperature of the canal and the number of fish caught per rod-hour of effort. But the catch rate declined markedly when the plant's power level dropped enough to lower the canal temperature appreciably. On these occasions, some fish acted as if they were stunned while being carried out of the canal by the current. No mortality of fish was observed. The authors concluded that anglers fishing in the canal expended only half the effort to catch the same amount of fish as those fishing at other places in the vicinity of the canal. [1 figure, 2 tables, 9 references] SW

9.19 (1.951)(1.0146)

concentrations than older ones. Zinc levels showed reverse results; these levels increased with age. Regional comparisons of metals in seal teeth showed no clear pattern except for cadmium and lead; these metals decreased in seals taken from the sites in the following order: Orkney and Shetland Islands, East Anglia, the Outer and Inner Hebrides Islands, and the Farne Islands.

The authors suggest that taking age into account is important in studying the concentrations of metals in tissues; conclusions based upon small samples can be misleading if the age of the animal (from which the samples were taken) is unknown. [2 figures, 4 tables, 11 references] SW

9.19 ACCUMULATION OF CESIUM-137 IN FINNISH LAPPS

Rahola, Tua, and Jorma K. Miettinen (Dep. Radiochem., Univ. Helsinki, Helsinki, Finland)
Chemical Abstracts 78, No. 23, 144802w (June 11, 1973)

9.19

those in pelican eggs. Cormorant eggs also had higher levels of mercury than pelican eggs. More insecticides and PCBs were concentrated in the fat of cormorants and pelicans than in any other tissue. The predominant residue was found to be DDT. [4 tables, 27 references] SW

9.19 THE ACUTE TOXICITY OF A YELLOW PHOSPHORUS CONTAMINATED DIET TO BROOK TROUT (SALVELINUS FONTINALIS)

Fletcher, G. L. (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Bulletin of Environmental Contamination and Toxicology 10, No. 2, 123-128 (Aug. 1973)

Contaminated cod muscle (containing 4-11 µg of yellow phosphorus per gram of muscle) and cod liver (containing 194 µg of yellow phosphorus per gram) were lethal when fed to brook trout. The toxic dosage of P_4 ranged from about 1.23 to 2.73 µg. This study further indicates that yellow phosphorus can exert its lethal effects internally.
[2 tables, 9 references] FTP

9.19 ENVIRONMENTAL IMPACT: CONTROLLING THE OVERALL LEVEL

Westman, Walter E. (University of Queensland, Brisbane, Queensland, Australia 4067), and Roger M. Gifford
Science 181, No. 4102, 819-825 (Aug. 31, 1973)

The interactions of three elements are suggested as influencing the rise of current environmental problems. They are (1) the size of the human population and its rate of growth, (2) increasing consumption of goods, and (3) resource wasting and pollution generating technologies. Other reports indicate that unchecked growth of these three factors is inimical to the continuation of civilization. In dynamic systems, it appears that negative feedback is necessary to achieve a long-term steady state. If natural environmental feedback were to arrive in full force, such as that predicted by Malthus, there would be much hardship. To avert such hardships, the authors describe a mechanism that acts as a rapid, anticipatory feedback system and also limits the impact that society makes on the environment. The system has three features that would control environmental impact: (1) it could be used to set the rate of environmental decay within a wide range, (2) restrict activities that have severe, irreversible, adverse effects on the environment, and (3) set some restriction on personal freedom.

The basis of the system is the natural resource unit (NRU). Every resource use and activity (including childbirth) that causes environmental impact is assigned a price in money-independent NRU's. NRU's would be allocated equally to all individuals and to other organizations including government agencies. The government would fix the annual allocation and price of NRU's for each good, service, and activity, based on the overall level of environmental impact gathered from existing

9.19 ORAL TOXICITY OF CHLORINATED DIBENZOFURANS TO JUVENILE ATLANTIC SALMON

Zitko, V. (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada), and P. M. K. Choi
Bulletin of Environmental Contamination and Toxicology 10, No. 2, 120-122 (Aug. 1973)

The levels of chlorinated dibenzofurans in the tissues of juvenile salmon (Salmo salar) were determined; the chemicals were administered to the fish by incorporating them in the dry fish food. The dry fish food was spiked with di-, tri-, tetra-, and octachlorodibenzofuran at calculated and (determined) levels of 2.7 (2.1), 5.7 (4.4), 2.8 (2.2), and 9.1 (9.7) µg/g, respectively. The fish were kept in 20-liter tanks and were fed the food several times a day.

The median mortality (LT50) was 120±30 days for the fish on the diet containing the chlorinated dibenzofurans. Apparently the chlorinated dibenzofurans are more toxic than PCB. Di-, tri-, and tetrachlorodibenzofuran were not detected in any of the samples of muscle or gut of the dead or live fishes. Because of the high toxicity and low residual levels of chlorinated dibenzofurans, a more sensitive method of analysis is needed. Also, considerable more work is required on the mechanism and kinetics of the formation of these compounds and on their toxicity.
[1 table, 5 references] FTP

9.19 PRELIMINARY SURVEY OF MERCURY AND OTHER METALS CONTAINED IN ANIMALS FROM THE FRASER RIVER MUDFLATS

Parsons, T. R., C. A. Bawden, and W. A. Heath (Institute of Oceanography, University of British Columbia, Vancouver, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 7, 1014-1016 (July 1973)

The content of mercury and other heavy metals was determined in crabs and other marine animals taken from the Sturgeon Bank and Roberts Bank of the Fraser River mudflats. For comparative purposes, samples of marine organisms taken from two other areas, the Cowichan Bay mudflats and Kitimat Arm, were also analyzed. The highest levels of mercury and heavy metals were found in samples of marine animals from Sturgeon Bank; these data indicate that the Fraser River was probably not the source of the pollutants. The city sewer outfall empties onto Sturgeon Bank which may account for the source of the heavy metal contamination. The mercury content of the meat of crabs taken from the mudflats is shown in the table that follows.
[1 table, 2 references] FTP

9.19 TREATMENT OF EEFLUENT FROM MANUFACTURE OF CHLORINATED PESTICIDES WITH A SYNTHETIC, POLYMERIC ADSORBENT, AMBERLITE XAD-4

Kennedy, David G. (Research Div., Rohm and Haas Co., Philadelphia, PA 19137)
Environmental Science and Technology 7, No. 2, 138-141 (Feb. 1973)

Amberlite XAD-4 is a crosslinked polystyrene copolymer in the form of 20-50 mesh beads; the bead porosity is 51 volume percent; the surface of the bead area is about 750 m^2/g; and the average pore diameter is 50 Å. The properties of this material make it applicable to treating waste effluents containing chlorinated pesticides. In addition, the hydrophobic properties of XAD-4 enable it to adsorb hydrophobic pesticides from aqueous systems. The pesticides were reported to be adsorbed even from very dilute solutions. Leakage of pesticides from a column containing the material was less than 0.25 p/m. The XAD-4 can be regenerated by subjecting it to treatment with solvents such as methanol or isopropanol. In comparison with an activated granular carbon column, the XAD-4 column leaked less pesticide, and the activated carbon could not be regenerated with isopropanol. In comparisons of operating expenses, pesticide waste treatment with XAD-4 would be more economical than with activated carbon because the former can be chemically regenerated and the solvent can be reused. The adsorbed pesticides can be recovered from the solvent and recycled, to lower operating expenses.
[3 figures, 5 tables, 4 references] SW

9.19

Size of crab (width of carapace)	Mercury content of the meat of crabs from areas: Fraser River Mudflats			
	Sturgeon Bank	Roberts Bank	Cowichan Bay	Kitimat Arm
mm	p/m	p/m	p/m	p/m
95	0.48			
98	0.43			
99	0.37			
108	0.43			
121				0.14
122		0.21		
125		0.18		
138		0.34		
142				0.42
144				0.49
145			0.12	
146		0.32		
147	3.7			
148	2.2			
151	3.0		0.44	
152	1.9 & 1.5			
155		0.90		
156				0.26
159	3.4			
160			0.13	
161	1.5 & 2.0			
165			0.25 & 0.15	
170				0.50

9.19 EPIDEMIOLOGY OF DDT
(9 6)

Davies, John E., and Walter F. Edmundson (editors)
Futura Publishing Co., Inc., New York, N.Y. (1972), x + 157 pp. Price $14.95.
F. P. W. Winteringham (Joint FAO/IAEA, Vienna, Austria) (reviewer)
Pesticide Biochemistry and Physiology 3, No. 2, 223 (June 1973)

This monograph is a series of reports by various authors consisting of data on pesticide exposure, residues found in human tissue samples, health, social, and environmental status under conditions in Florida (U.S.A.), with particular reference to DDT, its biochemistry and pharmacology. The reviewer states that these studies suggest some interesting findings some of which are: Conspicious gaps in quantitative information remain concerning the overall fate of DDT in man; DDE in human tissue is a better indicator than is DDT of long-term exposure; and routes of DDT exposure in man other than residues in food may be significant. FTP

9.19 EFFECT OF DDT ON TEMPERATURE SELECTION OF SOME SALMONIDS

Javaid, M. Yaqub (Dep. Biol., Carleton Univ., Ottawa, Ontario, Canada)
Chemical Abstracts 78, No. 23, 144105w (June 11, 1973)

9.19

data and social priorities. The NRU system would complement the existing money based system. The NRU system would set a national "fiscal" policy to control the rate of consumption of resources and the rate of pollution released; thus, the government would continuously control the level of environmental impact by a form of rationing. The NRU differs from money in that it is nontransferable. The NRU system differs from laissez-faire capitalism in the governmental adjustment of NRU prices and regulation of the supply of the NRU's. The NRU system differs from a mixed economy (Western capitalism) in governmental regulation of resource utilization, and it differs from a command economy (U.S.S.R.) in an emphasis on consumer choice in the allocation of resources among the population.

Among the developing nations of the world, the concept of limiting activities that adversely affect the environment would be rejected because it would lock them into their underprivileged status. The authors suggest that the NRU system is not acceptable to the public at this time; however, as levels of pollution increase, pressure will mount for action to limit population growth and other activities that have environmental impact.
[50 references] SW

9.19 ADVANCES IN WATER POLLUTION RESEARCH
(9.6)
Jenkins, S. H. (editor)
Pergamon Press, New York (1973), xxvi + 946 pp. Price not given

This book consists of the proceedings of the Sixth International Conference of the International Association on Water Pollution Research held in Jerusalem, June 18-23, 1972. Topics covered include: oxygen transfer relative to thermal pollution; trace metals, microbiology and virology of waste water, groundwater, eutrophication, sewers and storm water; and sewage treatment. A major topic that is of interest to fishermen and fishfood processors is the one on industrial waste water problems (pp. 549-625). Other major topics include advanced treatment processes with reuse of waste water, and water management relative to water quality. This group includes reports on mercury analysis (p. 819) and the transitional condition of Minamata Bay, Japan, with regard to mercury pollution (p. 905). SW

9.19 WATER POLLUTION MANUAL 1972
(9.6)

Thunderbird Enterprises Ltd., 102 College Road, Harrow, HA1 1BQ Middlesex, England
(n.d.), over 300 pp. Price £12.80, US$40.00.

This reference book deals exclusively with effluent and water treatment. The 26 editorial sections are written by specialists in their particular field, and they present a summary of the latest available information in products, materials, and processes. FTP

9.19 (1.951) ORGANOCHLORINE RESIDUES IN HARP SEALS (PAGOPHILUS GROENLANDICUS) CAUGHT IN EASTERN CANADIAN WATERS

Frank, R. (Pesticide Residue Laboratory, Ontario Ministry of Agriculture and Food, Guelph, Ontario, Canada), K. Ronald, and H. E. Braun
Journal of the Fisheries Research Board of Canada 30, No. 8, 1053-1063 (Aug. 1973)

Samples of blubber, brain, and other tissues of wild harp seals, captured in the Gulf of St. Lawrence and off the east coasts of Newfoundland and Labrador, were analyzed for organochlorine pesticides. The level of DDT and its metabolites in the blubber of juveniles taken from the gulf was more than 2 p/m and less than 2 p/m in the blubber from seals taken in the two east coast locations. The levels increased as the animals matured and were found to level off in females tested at the breeding age. (Differences in levels of the pesticide in adult females taken from either location were not marked.)

Dieldrin did not accumulate appreciably. PCB levels were slightly less than those of DDT (and its metabolites) in the blubber and increased with the age of the seal. PCBs accumulated two to three times more in young seals taken from the gulf than in those taken from the east coasts of Newfoundland and Labrador. Among adult females from either location, the differences in PCB levels were small. In samples of brain, the levels of the three compounds were significantly less than those found in the other tissues sampled; the authors suggest the existence of a brain barrier. Levels of the three compounds in the tissues of captive seals were up to eight times higher than in wild seals. This difference indicated that either natural diets contained lower levels of the residues or there are different rates of

9.19 (8.42) MERCURY IN FISH AND SHELLFISH. A REVIEW

Holden, A. V. (Freshwater Fisheries Laboratory, Pitlochry, Scotland)
Journal of Food Technology 8, No. 1, 1-25 (Mar. 1973)

This review is a brief description of the historical events leading to the problem of mercury levels in fish, the analytical methods now available for the routine analysis of methyl mercury and total mercury in fish, the levels of mercury in various species of fish (freshwater and marine) in different areas of the world, the toxicological significance of mercury in human food, and the problem of establishing a limit of acceptability for mercury residues in food. It appears that for most marine species of fish, levels of mercury of the order of 0.1 mg/kg are normal, with higher values for the large predatory fish and much higher for the mammalian carnivore. For freshwater fish, levels up to 0.5 mg/kg may be normal for some predatory species, but there is greater variability among samples from different areas. The high levels in marine fish in excess of 1 mg/kg occur most likely in coastal areas of local discharges of mercury-containing wastes.

The present level of mercury in oceanic water is presumed to be at equilibrium (as a result of mercury discharge from the rivers and from volcanic disturbances). It is estimated that discharge of mercury to the oceans is twice that contributed by natural discharge. The present level in the oceans is probably greater than that of 50 years ago. If the total discharge of mercury from industrial establishments is decreased significantly, a slight decrease in the oceanic water equilibrium level might be expected.

9.19 MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART II. BIOLOGICAL INVESTIGATIONS

Various authors and papers listed below
Dorothy F. Soule and Mikihiko Oguri (editors)
Published by the Allan Hancock Foundation and the Office of Sea Grant Programs, University of Southern California, Los Angeles, CA 90007 (June 1973), iv + 237 pp.

Card A

This bulletin presents the results of the biological studies of the role of cannery effluent on the ecosystems of adjacent Los Angeles Harbor waters. The reports are as follows:

"Introduction," by Dorothy F. Soule and Mikihiko Oguri, pp. 3-19. The results indicate that the harbor waters are highly productive at every trophic level monitored. [4 figures, 2 tables, 11 references]

"Free Amino Acid Variations in the Anchovy, Engraulis mordax from the Los Angeles Harbor," by Rita D. Schafer and Elizabeth Swann, pp. 23-27. In this study an attempt was made to determine whether or not the conditions in the Los Angeles Harbor affected the biological composition of the anchovy present in the water. Analyses were made of the free amino-acid content of the white muscle tissue of specimens of anchovy taken within the Los Angeles Harbor area; these data were compared with those from specimens taken from waters outside the harbor area. The free amino-acid content within an organism is a reflection of the protein metabolism of that organism. Data are given on the content of 33 free amino acids in the white muscle in three specimens from the harbor area and in one control sample. The results indicate that changes do occur in specimens of anchovy found in the Los Angeles Harbor area. [1 table, 2 references]

9.19 MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART II. BIOLOGICAL INVESTIGATIONS

Various authors and papers listed below
Dorothy F. Soule and Mikihiko Oguri (editors)
Published by the Allan Hancock Foundation and the Office of Sea Grant Programs, University of Southern California, Los Angeles, CA 90007 (June 1973), iv + 237 pp.

Card B

"The Demersal Fish Populations of San Pedro Bay," by John S. Stephens, Jr., and David Gardiner, pp. 149-166. Sixty-one trawl samplings were made of the demersal fishes of San Pedro Bay outside of Los Angeles - Long Beach Harbor. The average catch per trawl outside the harbor is less than that previously found in the harbor and seems to indicate that harbor waters may support as rich a fish fauna, if not richer, than that of adjacent areas. The various species landed and the catch rates are described. [5 figures, 3 tables, 7 references]

"Annotated Bibliography on the Northern Anchovy, Engraulis mordax Girard," by Gary D. Brewer, pp. 169-191. This bibliography contains 101 references to the published literature on the northern anchovy prior to 1973.

"Numerical Analysis of a Benthic Transect in the Vicinity of Waste Discharges in Outer Los Angeles Harbor," by Robert W. Smith, pp. 195-237. Various approaches may be used to determine the effects of waste discharges on the benthos: (1) The direct effect of the constituents of the waste on organisms can be determined directly, (2) The degree of abnormalities and of disease in the organisms in the vicinity of the waste discharges can serve as an indicator of the harmful effects of the waste materials, (3) The level of the population of certain "indicator species"

9.19 (8.42)

Restriction on the consumption of fish containing up to 1 mg/kg of mercury appears unnecessarily cautious, but heavy consumption of fish from areas where local pollution has resulted in levels well above 1 mg/kg in fish should be discouraged.

The 'practical residue limit' of mercury recommended by WHO (World Health Organization) for food generally is 0.02-0.05 mg/kg, but this limit is clearly not applicable to fish. The limit of 0.5 mg/kg would create problems with fisheries for certain species such as tuna and swordfish and possibly for lobsters and some mollusks. At a limit of 0.2 mg/kg, a wide range of species, including gadoids and flatfish and many freshwater fish, would be restricted. A maximum level of 1 mg/kg would cause little difficulty, except in some areas where freshwater fish are involved. In view of the importance of fish as a protein source in many parts of the world, the author believes that it is essential that a decision on the maximum mercury content permissible for fish for human consumption be reached as soon as possible.

[2 tables, 83 references] FTP

9.19

(organisms commonly found at certain known levels of pollution) may be used as an index of the pollutant effects. In the present study, the researchers applied a principal component analysis and a hierarchical classification method to sort out some of the biotic-abiotic relationships of the benthos in the vicinity of waste outfalls in outer Los Angeles Harbor. [7 figures, 6 tables, 54 references] FTP

9.19 LEAD-210 IN SOME HYDROBIONTS OF THE SEA OF OKHOTSK AND THE BERING SEA

Sokolova, N. V., and V. P. Parchevskii (Inst. Biol. Yuzhn. Morei, Sevastopol, U.S.S.R.)

Chemical Abstracts 78, No. 25, 156110g (June 25, 1973)

9.19 (1.951)

uptake between captive and wild seals. The authors further suggest that the differences in residue levels in young wild harp seals taken from the gulf and the levels in seals taken from the coastal regions may indicate the existence of subpopulation groups.

[8 tables, 13 references] SW

9.19 MERCURY, LEAD, AND CADMIUM CONTENT IN THE HAIR OF RESIDENTS OF THE TOKYO METROPOLITAN AREA

Nishima, Taichiro, Shingo Ideda, Takahiro Tada, Hitoshi Yagyu, Mamoru Nagasaki, Ryoji Udo, and Hitoshi Kamijo (Tokyo Metrop. Res. Lab. Public Health, Tokyo, Japan)

Chemical Abstracts 78, No. 23, 144092q (June 11, 1973)

9.19

"The Roles of Microbial Activity in the Harbor Ecosystem," by Damian Marie Juge and Gail Griest, pp. 31-63. In this study (1) dye-bacterial organism diffusion tests were made to determine the circulation of water in the Los Angeles Harbor area of the cannery and domestic outfalls and (2) surface water samples were tested monthly during the period of July 1972 to March 1973 for biochemical oxygen demand (BOD), standard bacterial plate count, and coliform organisms count. It appears that the effluent from the canneries do have an enhancing effect on the bacterial population level at certain stations in the harbor area. [18 figures, 2 tables, 4 references]

"Working Report on the Dilution of Cannery Wastes Discharges Into the Los Angeles Harbor," by James E. Foxworthy, pp. 67-77. This paper reports the data obtained in the tests to determine the water circulation and physical dilution of the cannery wastes effluent in Los Angeles Harbor. Four tests were carried out in which the waste effluent was tagged with a fluorescent dye at the pumping station and was then traced and monitored as it mixed with harbor water. [1 figure, 1 table, 3 references]

"Annotated Bibliography on Cannery Effluents," by Penny A. Pinter, pp. 81-103. Ninety-two references are listed relating to the history of the fishing industry on the Pacific coast, products of the industry, processing methods, and effluent effects and treatment.

"Results of Fourteen Benthic Trawls Conducted in the Outer Los Angeles - Long Beach Harbor, California, May 24, 1972," by Dilworth W. Chamberlain, pp. 109-145. A preliminary trawl survey was made on May 24, 1972, in the Los Angeles - Long Beach Harbor to determine the species of fish available and their physical condition. The trawling yielded 3,100 fish belonging to 28 species, and representing 15 families and 7 orders. Five species (speckled sanddab, tongue sole, white croaker, shiner perch, and white seaperch) made up 85% of the total catch. The fish collected appeared in good health. [14 figures, 2 tables, 24 references]

[Continued on Card B]

9.19 (0.35)(0.5) OXIDATION OF POLYCHLORINATED BIPHENYLS BY ACHROMOBACTER pCB

Ahmed, M., and D. D. Focht (Dept. of Soil Science and Agricultural Engineering, University of California, Riverside, Calif.)
Bulletin of Environmental Contamination and Toxicology 10, No. 2, 70-72 (Aug. 1973)

In an earlier report the authors showed that a species of Achromobacter pCB (isolated from sewage effluent) was able to degrade certain mono- and dichlorinated biphenyls. As a continuation of the earlier study, they tested the ability of this organism to degrade other isomers of polychlorinated biphenyls with 2 to 5 chlorine atoms. The following chemicals were used: 2,3-dichlorobiphenyl, 2,4-dichlorobiphenyl, 3,4-dichlorobiphenyl, 3,5-dichlorobiphenyl, 3,3'-dichlorobiphenyl, 3,4,2'-trichlorobiphenyl, 2,3,2',3'-tetrachlorobiphenyl, 2,5,3',4'-tetrachlorobiphenyl, and 2,3,4,5,6-pentachlorobiphenyl. The test procedure is described in the Canadian Journal of Microbiology (in press).

The bacterium was not able to degrade (dehalogenate) any of the chlorinated biphenyls tested.

[1 table, 2 references] FTP

9.2 WORLD FOOD SITUATION: PESSIMISM COMES BACK INTO VOGUE

Wade, Nicholas
Science 181, No. 4100, 634-638 (Aug. 17, 1973)

This review of world food developments suggests that the situation now is more serious than in 1965-67 when American grain was used to supplement poor harvests in India. All countries except India now have enough grain to cover their immediate needs, but world grain stocks are down to the lowest level in 20 years. The amount of food available for next year's needs depends on this year's harvests. The weather is a crucial factor everywhere, and successful harvests, in India particularly, require a normal monsoon season to avoid a disaster. In addition to the concern over sufficient food to avoid price disturbances, political instabilities, and famine, there are fears that a fundamental deterioration in the world food situation has occurred. Since 1943 there has been no major famine--probably the longest famine-free period in recorded history. In this period, although average diets were meager, there was a slight improvement in the amount of food consumed per person. But malnutrition persisted in the developing countries--affecting 300 to 500 million people. In addition, the overall condition of the world food situation was generally stable. In the mid-1960's the U.S. Dept. of Agriculture (USDA) forecast that, by 1984, food needed by the developing countries would eventually exceed what the United States could give away. A tract [Famine 1975!] by Paul and William Paddock, predicted that crises of food shortages will break out by 1975, 9 years earlier than the USDA prediction. "The Time of Famines" will have begun again. These pessimistic estimates of the food situation were displaced

9.2 PRACTICAL PROBLEMS OF CONSTRUCTING BIOECONOMIC MODELS FOR FISHERY MANAGEMENT

Adam, Paul (Fisheries Division, Organization for Economic Cooperation and Development)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 96-103.

In many practical cases it is impossible to construct a complete bioeconomic model of a given fish stock, such as when one or several fleets move irregularly from one stock to another, or when fishing effort increases so rapidly that it is not possible to accurately specify a reliable yield/effort relationship. A continuing bioeconomic model is proposed here which will allow inclusion of these dimensions while allowing both for year-to-year fluctuations in managed effort and also for gradual adjustment of labor and capital to those levels designated as optimal within the broad ranges of this continuing model. Year-to-year re-evaluation of fish stocks and capital-labor requirements is stressed.

[5 figures] Author's abstract

9.2 AN ENVIRONMENTAL ASSESSMENT OF FUTURE PRODUCTION-RELATED TECHNOLOGICAL CHANGE: 1970-2000 (AN INPUT-OUTPUT APPROACH)

Herzog, Henry W., Jr. (Bureau of Business and Economic Research, University of Maryland, College Park, Md.)
Technological Forecasting and Social Change 5, No. 1, 75-90 (1973)

In this article, the author develops a model to systematically assess the environmental impact of specific technological changes forecast to occur over this and the following two decades.

[10 tables, 9 references] FTP

9.2 OPTIMIZATION IN COMPLEX MANAGEMENT SYSTEMS

Spivey, W. Allen (Graduate School of Business Administration, Ann Arbor, MI 48104)
Transactions of the American Fisheries Society 102, No. 2, 492-499 (Apr. 1973)

An optimization model is a model in which there is a function (of decision variables) to be optimized--either maximized or minimized. The decision variables may or may not be subject to constraints. Fisheries management and other renewable resource management problems can be solved or mitigated by means of optimization models. Linear optimization problems (in which the function to be optimized is linear and the constraints are linear) are more amenable to solution than nonlinear optimization problems.

The author provided illustrative examples showing how optimization models may be applied to water pollution control and other problems. In addition, he discussed problems in using and interpreting optimization models. The author concluded that successful model building requires effective interaction between formulation, analysis, and decision.

[3 figures, 26 references] SW

9.2 (9.3) MULTIPLE OBJECTIVES FOR MARINE RESOURCE MANAGEMENT

Rettig, R. Bruce (Dept. of Agricultural Economics, Oregon State University, Corvallis, OR 97331)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 23-27.

Management decisions suggested by recent bioeconomic models have been largely disregarded by fishery managers. This negligible impact may be due to error on the part of management, an incomplete grasp of the role of noneconomic objectives, and/or the possibility that more sophisticated economic models might yield markedly different results. More sophisticated models are suggested which consider the problem of second best, risk and uncertainty, transaction and adjustment costs, and income redistribution. Creation of analytical systems amenable to treatment of noneconomic variables along with economic variables is suggested.

[7 references] Author's abstract

9.2 SIMULATION EXPERIMENTS TO EVALUATE ALTERNATIVE HUNTING STRATEGIES FOR A DEER POPULATION

Anderson, F. M. (Dept. of Agricultural Economics, Oregon State University, Corvallis, Oreg.), G. E. Connolly, A. N. Halter, and W. M. Longhurst
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 121-132.

A population dynamics model of the deer herd in Mendocino County, California, is presented. Environmental influences are modeled as density dependent birth and death rate functions. The computer program for this biomanagement model is outlined and validity checks devised to improve the model are discussed. The output shows the impact of selected hunting strategies on productivity, natural mortality, and other population characteristics. Tests of hunting strategies related to alternative management goals are summarized. Implications of computer simulation methodology for the management of wildlife and fish populations are discussed.

[6 figures, 1 table] Authors' abstract

9.2

by news of the "Green Revolution." New strains of rice and wheat, from the Philippines and Mexico, produced yields many times greater than native varieties, under certain conditions. The new Mexican wheats produced bumper crops in the Punjab of India; unfortunately, wheat is not the major cereal crop of India. The new rice requires irrigated land which forms only 30% of the crop land in Asia. In addition, these new varieties required agricultural technology, such as use of high priced fertilizer, found only in the developed countries. This criticism caused the optimism generated by the Green Revolution to subside.

In 1972, the U.S.S.R. had a bad harvest; to maintain their meat herds, 30 million tons of grain were purchased on the world market. This caused grain prices to rise to historic highs and doubled shipping rates. Other countries were in the market also. Drought in the countries in the southern Sahara Desert caused a genuine famine which affected 1 to 10 million people. The Peruvian anchoveta fishery (which produced fish meal for feed) failed again in 1972 and may be permanently damaged. This caused livestock owners to use more grains for feed. Sharp increases in grain prices and reductions in wheat reserves held by the U.S. Government resulted from these events. In the short-term view, the 1973 harvest will replenish the stocks, and prices will come down. In the 1980's, the prospects for world food supplies are not cheerful: production of protein cannot be increased; increases in cereal production are forecast but are dependent on the weather; and the use of high yield strains of crops could cause social changes by reducing employment and increasing the gap between rich and poor farmers. The check on population--famine, theorized by Malthus--may now be preceded by the constraints of rural unemployment, income inequality, and social unrest.

[1 graph] SW

9.2 SOME SUGGESTIONS FOR THE DEVELOPMENT OF A BIOECONOMIC THEORY OF THE FISHERY

Thompson, Russell G. (Quantitative Management Science, University of Houston)
NOAA Technical Report NMFS CIRC-371, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98115 (Apr. 1973), pp. 92-95.

In this study, the fundamental characteristics of the Schaefer model and the Thompson-George (TG) production-investment model are reviewed, and extension of the TG model are discussed. It is then indicated how a bioeconomic model for the sole ownership fishery may be obtained by adjoining the Schaefer model to the TG model (or any of the extension). This leads into a discussion of the fundamental variables in a dynamic analysis of the fishery problem and the limitations of published bioeconomic analyses. It is further pointed out that further work needs to be directed to the formulation of catch functions allowing for varying marginal returns with respect to fishing effort, in particular.
[14 references] Author's abstract

9.2 (1.0158) HONG KONG ANNUAL DEPARTMENTAL REPORT FOR THE FINANCIAL YEAR 1970-71 (1ST APRIL 1970-31ST MARCH 1971)

Nichols, E. H. (Agriculture and Fisheries Dept., 393 Canton Road, Kowloon, Hong Kong)
Printed and published by J. R. Lee, Government Printer at the Government Press, Java Road, Hong Kong (n.d.), 90 pp. (Code No. 0342271) Price: Hong Kong $9.00.

This report, on the activities of the fisheries, is part of the Annual Departmental Report on the state of the industries.

Hong Kong has a total land area of 398½ sq mi and lies on the southeast coast of China. The mean daily temperature ranges from about 15° C in February to 28° C in July. About 9 in of rain falls from November to March, and about 76 in falls from April to September with the risk of typhoons. The topography is rugged and the soils are thin, acidic, and low in nutrients.

The waters of the continental shelf are fished, and many vessles venture as far as Hainan Island (240 mi southwest of Hong Kong). There were a total of 5,600 fishing vessels (75% are motorized) and an estimated 45,000 fishermen employed in 1970, a decrease in the number of vessels and fishermen from 1969. The fleet consists of four main groups: trawlers, long-liners, gill netters, and purse seiners.

As a result of government encouragement and technical advice, modernization has taken place in trawlers and long-liner types of vessels. Low-interest rate loans and funds from the commercial sector made possible completion of 764 new vessels.

The total domestic consumption of marine fish was estimated to be 100,000 metric tons. The fishing fleet output satisfied 94% of demand, and the balance

9.2 NEW VENTURE PLANNING: THE ROLE OF TECHNOLOGICAL FORECASTING

Blackman, A. Wade, Jr. (United Aircraft Research Laboratories, East Hartford, CT 06108)
Technological Forecasting and Social Change 5, No. 1, 25-49 (1973)

The author describes a system for the analysis and planning of new ventures that provides a structure for the application of logical, mathematical, and scientific procedures to decision problems which (1) involve a significant portion of an organization's resources, (2) have long-term effects on a firm's future success, and (3) are characterized by uncertainty in many factors important to the decision. The system is based upon the methodologies of technological forecasting, decision analysis, and systems dynamics.
[21 figures, 34 references] FTP

9.3 RECENT DEVELOPMENTS IN THE LAW OF THE SEA IV: A SYNOPSIS

Greenblatt, Gershon D., James Robert Miller, and Alfred J. Waldchen
San Diego Law Review 10, No. 3, 559-598 (May 1973)

This fourth annual synopsis covers important events relative to the law of the sea that occurred from Feb. 1, 1972 to Jan. 21, 1973. The major sources of information for the synopsis were the New York Times, the Environmental Reporter, the United States Code Congressional and Administrative News, the Congressional Record, the United Nations Chronicle, and International Legal Materials. The subject areas covered are conservation, fishing, seabed resources, shipping, and sovereignty.
[101 footnotes] FTP

9.2 ON INNOVATION, SOCIAL CHANGE, AND REALITY

Brewer, Garry D. (Rand Corp., Santa Monica, Calif.)
Technological Forecasting and Social Change 5, No. 1, 19-24 (1973)

Innovation in social affairs is a complex and demanding process; there are many general reasons why an innovation either fails to be realized or is incorporated in totally unforeseen ways, and there are important specific reasons, associated with individual contexts where innovation is taken, that must be taken into account. The would-be innovator and his ideas may fail if the idea of quid pro quo is ignored, if facile assumptions are made about the clarity and importance of the proposed changes, and if there is a failure to take into account a range of reactions and distortions of implementation. The concept of innovation may be thought of as a four-step process involving initiation, reaction or rejection, partial incorporation, and diffusion phases. Each phase, the author indicates, presents different problems and opportunities, and each must be considered seriously and explicitly if an innovation is to turn out even remotely as its proponents originally intended.
[7 references and a general bibliography of 8 references] FTP

9.3 THE OCEAN DUMPING CONVENTION -- A HOPEFUL BEGINNING

Leitzell, Terry L. (Dept. of State, Washington, D.C.)
San Diego Law Review 10, No. 3, 502-513 (May 1973)

The Convention on the Prevention of Marine Pollution By Dumping Wastes and Other Matter in the Oceans was opened for signature in Washington, Moscow, London, and Mexico City on Dec. 29, 1972; on that day it was signed by 27 States. This paper reports on the history of the Convention, the structure of the Convention, institutional arrangements for handling the responsibilities relative to the Convention, jurisdiction and enforcement of the standards set out in the Convention, and amendment procedures. The author believes that the Convention provides hope for the solution of global environmental problems, and that it will be the first step in a series of conventions and arrangements to protect the marine environment.
[46 footnotes] FTP

9.2 [COST OF LIVING AND PRICE OF FISH]
COSTO DE VIDA Y PRECIOS DE PESCADO

Malaret, A. E. (Proy. Desarrollo Pesq., Casilla de Correo 288, Mar del Plata, Argentina), O. J. Lascano, and A. A. Gumy
Publ. Proy. Desarr. Pesq. Gob. Argent. FAO, Mar del Plata, 42, 41 pp. (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 3, Abstract No. 3Q2937m, 195 (Mar. 1973)

An investigation was made of the effect the price of fish has on the cost of living in Argentina, and the effect the cost of living has on the price of fish. The following factors were also considered: the geographical reasons for price differences, distribution and other commercial aspects of marketing, types of fish and products involved, price fluctuations, monetary value of fish nutrients, and the relation between fish and meat consumption. Hake, sea bream, squid, and crustaceans were the food fish investigated.

Transport to interior markets can cause price increases by 100%. Intermediate fish handlers were found to absorb 40-70% of the sale price. Hake prices were mostly free from the influence of the price of meat, but the price of meat significantly influenced the demand for fish. In general, the survey indicated that fish represented good value in terms of nutrition per unit cost in Argentina. SW

9.2 (1.0158)

was imported from China. Sixty-six percent of the fleet output came from trawlers and was sold through wholesale fish markets operated by the department fish marketing organization. Fish landings from trawlers and purse seiners increased over 1969, while those from long-liners and gill netters decreased. The decrease in the catch by long-liners was attributed to a shortage of crew members.

Landings of marine fish were valued at $141 million, an increase of 16.5% due mainly to a rise in prices. The total production of marine and freshwater fish, crustacea, mollusks, aquarium fish, and fish oils and fertilizers was 123,448 metric tons valued at an estimated $327.6 million. This production was higher by 5.4% in quantity and 12.8% in value over 1969.

A total of 2,470 acres was devoted to fish farming. Grey mullet, silver, grass, and common carp, and big head were the main species cultivated. Production was estimated to be 2,266 metric tons valued at $15 million, a substantial increase over 1969.

Production of oyster meat was 142 tons--worth $1.409 million.

The Fisheries Research Division has been investigating marine resources, mariculture, and inland fish culture. The research vessel Cape St. Mary completed 17 trips including offshore cruises, studies in territorial waters, and training cruises for fishermen students.

Fisheries extension activities assisted fishermen in the socio-economic sphere by introduction of new and improved production techniques, equipment, and methods. Adequate credit was available, and improved marketing was provided. Training was made available in navigation, boat handling, engineering, and boat building. Co-op societies were encouraged to raise the standard of living through voluntary savings plans and better housing plans. Assistance for rehabilitation and relief from typhoon damage sustained by fishermen was provided. SW

9.3 (1.0112) A LIMITED ENTRY PROGRAM FOR ALASKA'S FISHERIES

Report prepared by the Governor's Limited Entry Study Group
A publication of the State of Alaska, Juneau, Alaska (Feb. 1973), 307 pp.

The material in this report was gathered to provide the information necessary to develop a program for limiting entry into Alaska's fisheries and applying that program to the salmon fishery. More data is being gathered in the study and will be presented in the future. The work of limiting entry will be carried out by a full-time regulatory commission and a professional staff. The commission will set a maximum allowable number of units of gear for each type of gear in the area studied. After gear levels are set up, the commission will set regulations for deciding who will get the entry permits. The regulations will then be used to set up a group of priority classifications into which applicants for entry permits will be divided. A crew member of a vessel will not be required to hold an entry permit. An entry permit will be like property; a person may keep it for life, sell it, or transfer it. A person may hold more than one permit so that he may fish more than one type of gear or fish in more than one area. If the commission found it necessary to reduce the number of permits already issued, holders of permits that were surrendered to the commission would be compensated. This system is applicable to commercial fishing only. Sport fishing or subsistence fishing are not affected by the limited entry proposal. The limited entry system will be independent of the existing licensing system associated with commercial fishing. The system is designed to relieve the fishing pressure on any species that is under such stress: salmon, crab, and shrimp. The report contains 82 tables that define the number of

9.3 NEW DEVELOPMENTS IN THE UNITED NATIONS SEABED COMMITTEE

Oda, Shigeru (International Law, Tôhoku University, Japan)
Journal of Maritime Law and Commerce 4, No. 4, 577-598 (July 1973)

Past developments of the law of the sea are examined and analyzed and then a brief view of possible future developments are discussed. Several conclusions are formulated: (1) It seems likely that exploitation of fishing in the offshore areas will probably be conducted under concessions granted by coastal States. Such a regime probably should be institutionalized in order to harmonize the interests of the coastal States and the interests of the distant-water fishing nations. An intermediate fishing zone may be suggested. (2) The road has been paved for international control of the ocean floor far from the continents. This trend may eventually be a model for the regime of fishing. (3) Regarding preservation of the marine environment, probably the flag State of the vessels should be responsible, with possible delegation of part of such compentence and responsibility to the coastal State, since the coastal State would be most seriously affected by the pollution of the ocean.
[35 footnotes]

FTP

9.3 (1.3) THE STATE-OF-ORIGIN AS GUARDIANS OF ANADROMOUS FISH: A PROPOSAL

MacKenzie, William H.
Special Publication Series 3, No. 1, 1-71 (May 1972). Published by the International Atlantic Salmon Foundation, 435 Park Ave., New York, N.Y.

The two principles of international law, upon which the maintenance of order in international fishery exploitation is based, are (1) a state exercises exclusive jurisdiction over waters adjacent to its coast and (2) beyond these waters there is freedom of fishing. The author suggests that these principles can be incompatible with rational fishery management because they do not recognize the special relationship which anadromous fish have with their state-of-origin. The author defines anadromous fish as those which hatch in fresh water, migrate to the ocean, and return to fresh water to spawn. The state-of-origin is the nation in whose fresh waters the fish spawn. The special relationship is based upon the homing instinct of anadromous fish which causes them to return to their parent stream for spawning. Survival of the species requires successful completion of the spawning stage of their life cycle. There is no provision in international law for a state-of-origin to regulate the harvest of anadromous fish when they are on the high seas beyond the jurisdiction of that state. The author proposes that international law should be modified to recognize the special relationship between anadromous fish and the state-of-origin by according such a state special authority over such fish. That authority would include the right to protect anadromous fish during their entire life cycle. The state-of-origin, in exercising its authority, becomes the

9.6 CHECK LIST OF PUGET SOUND FISHES

DeLacy, Allan C., Bruce S. Miller, and Steven F. Borton
Washington Sea Grant Program Report, WSG 72-3, (July 1972), iv + 43 pp. Published by the University of Washington, Division of Marine Resources, Seattle, WA 98195.

To relate the fishes listed to locations where they were reported, Puget Sound was defined as an area limited on the west by a line drawn northward from Ediz Hook, near Port Angeles, Wash., to the United States-Canada international boundary line and the line northward to the mainland. The region was further divided into 12 areas based on oceanographic conditions and intensity of the collecting efforts.

Fifty-eight families of fish were reported that include 191 species. The family Cottidae (sculpins) contained the largest number of species reported (36). The Pacific staghorn sculpin (Leptocottus armatus) was the most common. The family containing the next largest number of species reported was Scorpaenidae, the best known being rockfish (Sebastes spp.), with 24 species reported. Copper rockfish (S. caurinus) was reported 50 or more times in 7 of the 12 areas of the Sound.

There were two flounder families listed: Bothidae and Plauronectidae, with 16 species reported. Of these, English sole (Psettichthys melanostictus), rock sole (Lepidopsetta bilineata), and starry flounder (Platichthys stellatus) were the most commonly reported in the order listed. Pacific halibut (Hippoglossus stenolepis) was sighted 50 or times in the Strait of Juan de Fuca and a little less in Admiralty Inlet. (It was not common or absent elsewhere.)

9.3 (1.3)

guardian of the fish from its streams. If international law is not modified to recognize the special relationship, the author suggests, the alternatives available to the state-of-origin to protect its anadromous fish either fail to protect the interests of that state or are impractical. Such alternatives are, for example, extension of its territorial sea, or threatening to invoke retaliatory economic measures against uncooperating harvesting states, and others. The author discusses the alternatives and describes the guardianship principle in detail with citations and quotations from other sources to corroborate and validate his views. [4 figures, 111 references] SW

9.3 FREEDOM OF OCEANIC RESEARCH

Wooster, Warren S. (editor)
Crane, Russak and Company, Inc., 52 Vanderbilt Ave., New York, NY 10017 (June 1973)
276 pp. Price $14.00.
Ocean Development and International Law Journal 1, No. 2, 220 (Summer 1973)

This book is a review of the evolving law of the sea concerning oceanic research. The study was carried out by a group of social scientists from the Center for Marine Affairs, Scripps Institution of Oceanography, and other U.S. academic centers. The book should be of timely interest and importance to political scientists, oceanographers, and others concerned with international ocean affairs and the future of oceanographic research. PTP

9.6

The family Agonidae (poachers) was represented by 13 species reported. The most common species was the sturgeon poacher (Agonus acipenserinus).

Pricklebacks, family Stichaeidae, were listed with 11 species reported, the most common being snake prickleback (Lumpenus sagitta). Lumpfishes and snailfishes, family Cyclopteridae, were represented by 10 species reported, mostly from the San Juan Islands area.

The best known species of the family Hexagrammidae (greenlings) was lingcod (Ophiodon elongatus). It was well reported in all areas except South Puget Sound. Others of the family were not so common.

There were seven shark families reported with 10 species listed. The most common shark was the spiny dogfish, family Squalidae (Squalus acanthias), found everywhere in the sound. Five skates, family Rajidae, were reported. Many longnose skates (Raja rhina) were reported off Everett, Wash. The ratfish (Hydrolagus colliei), family Chimaeridae, was common throughout the sound. Very few sturgeons, family Acipenseridae, were reported.

The Pacific herring (Clupea harengus pallasi), family Clupeidae, was common throughout the sound. Two other species listed were not common.

Salmons and trouts, family Salmonidae, were listed with eight species reported. The most commonly reported were the salmons except in the Port Orchard area. Only chinook ventured there and everywhere else in the sound. The cutthroat trout (Salmo clarki) was most common in the sound, with rainbow (S. gairdneri) and Dolly Varden (Salvelinus malma) sharing the next lower position for trout.

The smelts were reported with five species, the most common being surf smelt (Hypomesus pretiosus).

An 18-page bibliography, useful as source material for the list, is also presented. SW

9.3 (1.0112)

people in a fishery, years they have fished, number of vessels, value of vessels and gear by district, value of catch by year, amount of fish per vessel, type of gear, and amount of fish caught by year, earnings per vessel, and other information. Thirty figures show graphs that supplement the tables. A complete copy of the bill for limited entry, now before the Alaska Legislature, is also given. SW

9.3 INTERNATIONAL COMMISSION ON WHALING.
(1.953)(9.4) TWENTY-THIRD REPORT OF THE COMMISSION

Anonymous
Office of the International Commission on Whaling, Great Westminster House, Horsey Road, London SW1P 2AE, England (1973), 264 pp. Price not given.

This report relates to the 23rd meeting of the International Whaling Commission held in Washington, D.C., June 1971, and to the meeting of the Scientific Committee held in London, June 1972. The International Observer Scheme was implemented by the whaling nations during the year. Further limitations on the catch of whales were also made for the 1971/72 and 1972 seasons. In 1972/73, the blue whale unit as a means of expressing catch limits in the Antarctic would be superseded by limits by species. Appendix IV contains the report of the Scientific Committee. PTP

9.3 EVOLUTION OF THE LAW OF THE SEAS -- DESTRUCTION OF THE
(9.11) PRISTINE NATURE OF BASIC OCEANOGRAPHIC RESEARCH

Robinson, George S. (Smithsonian Institution, Washington, D.C.)
Natural Resources Journal 13, No. 3, 504-510 (July 1973)

The author reviews briefly the attitudes, politics, technology, and economics influencing the use and potential use of the oceans in order to determine the majority view of nations regarding the present status of the law of the seas. The law of the sea, he suggests, serves as the foundation of all spirit, if not legal substance, upon which international economic and political agreements and treaties rest. He believes that one of the most, if not the principal, expendable item in the upcoming multilateral negotiations on the law of the sea is the scientific research of the oceans. This premise relative to such expendability is based on the views and the relative influential posture of coastal States, the impelling needs of three or four major military countries, and the scientists themselves who are directly involved in ocean research. The author believes that scientific investigators are relatively uninformed of the seriousness of the forthcoming Law of the Sea Conference regarding freedom of scientific research and that there has been no real success in establishing a sophisticated position regarding scientific investigation of coastal waters. Furthermore, he states that a working conference to educate scientists as to what is happening to the law of the sea and how the changes will affect oceanographic research is long overdue. The time for serious, realistic involvement of scientists is at hand.
[3 footnotes] FTP

7.43 (7.53) MOISTURE AND FAT ANALYSIS OF MEAT AND MEAT PRODUCTS: A REVIEW AND COMPARISON OF METHODS

Pettinati, Julio D., Clifton E. Swift, and Edward H. Cohen (Eastern Regional Research Laboratory, Agricultural Research Service, U.S. Dept. of Agriculture, Philadelphia, PA 19118)
Journal of the Association of Official Analytical Chemists 56, No. 3, 544-561 (May 1973)

The authors reviewed the published analytical methods for moisture and fat in meat and meat products. In this report, the various methods are briefly described, and certain characteristics of the methods are given such as time required for analysis, sample size, accuracy, precision, and cost of the equipment. These various characteristics are summarized in two tables for the most promising methods for moisture (13 methods) and for fat (18 methods). The most useful rapid methods for quality control in the meat industry are:

Moisture.--High temperature mechanical convection oven drying; hot plate drying; moisture balance; and azeotropic distillation.

Fat.--Modified Babcock procedures; X-ray transmission; specific gravity of hexane extracts; and determination of fat in the extract from azeotropic moisture analysis (a combined method).

[2 tables, 129 references] FTP

9.6 (9.) MAN AND THE OCEAN

Skinner, Brian J., and Karl K. Turekian (Yale University, New Haven, Conn.)
Prentice-Hall, Inc., Englewood Cliffs, N.J. (1973), viii + 149 pp. Price not given.

This textbook is for beginning students in the earth sciences. It is one of the Foundations of Earth Science Series by the same publisher. A chapter provides a description of the ocean basins and hydrology of the sea. Three chapters are devoted to ocean resources: fisheries, mineral, and chemical. Another chapter covers derivation of energy from ocean waters. Chapters on desalinization and pollution of the oceans conclude the book. Suggestions for further reading and an index are provided, and many illustrations are included. SW

9.6 (9.3)(9.6) AN ANNOTATED BIBLIOGRAPHY FOR ECONOMIC EVALUATIONS OF THE AQUACULTURE OF SELECTED CRUSTACEANS AND MOLLUSKS

Johnston, Warren E., and Don W. Collinsworth (University of California)
Sea Grant Publication No. 2, UC-IMR Reference No. 74-3, Institute of Marine Resources, University of California, P.O. Box 1529, La Jolla, CA 92037 (Aug. 1973), 26 pp. Price not given.

This bibliography contains a list of selected sources (111 references) of economic data and of economic analyses dealing with aquaculture of certain crustaceans and mollusks. It concerns primarily the northern lobster, but it also contains some references on the spiny lobster and on certain species of crabs, oysters, and shrimp. The authors prepared this report for circulation at this time because of the widespread interest in aquaculture. FTP

9.7 (9.6) A PRE-VIEW OF POLICY SCIENCES

Lasswell, Harold D.
Elsevier Publishing Co., New York (1971), 173 pp. $7.50
Garry D. Brewer (Rand Corp., Santa Monica, Calif.) (reviewer)
Technological Forecasting and Social Change 4, No. 4, 423-424 (1973)

The purpose of this book is to provide a handy guide to the theory, development, and future diffusion of policy science. Policy science deals with the solution of societal problems within prescribed space-time configurations or contexts; it is premised on the proposition that the problem at hand should suggest a full range of methods and questions of inquiry; and it relates directly to those having authority over the allocation of valued resources. The book deals with such matters as the evolution of policy science as a separate differentiated body of theory and practice; detailed requirements of a contextual multimethod approach to problem solving; extensive discussions of the policy process; problems of professional development and identification; and methods to train a corps of policy scientists. The reviewer also states that the book is a difficult, serious work that bears careful attention of researchers, students, and practitioners. FTP

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Waldchen, Alfred J.	35	9.3
Walters, C. L. (rev.)	1	0.38
Watanabe, Tsuneo	4	0.38
Webb, N. B.	5	0.7
Weihs, D.	18	9.12
Wendler, Henry (ed.)	23	9.17
Wentworth, B. C.	27	9.19
Westman, Walter E.	29	9.19
Whitaker, John R.	1	0.38
White, David B.	19	9.16
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Winget, C. L.	3	0.5
Winteringham, F. P. W.	30	9.19
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Woodhouse, William W.	23	9.17
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Yagyu, Hiroshi	32	9.19
Young, David R.	25	9.19
Zabbarov, A. N.	26	9.19
Zitko, V.	29	9.19

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402 - Subscription price: $6.50 per year, ($1.75 additional for foreign mailing). Single copy 65 cents

0.36 (8.8) [RELATIONSHIP BETWEEN THE TENDERNESS OF FISH MEAT AND ITS PROTEIN/WATER/FAT AND PROTEIN/WATER COEFFICIENTS]

Tsuladze, E. A. (Gruzinskoe Otdelenie VNIRO, U.S.S.R.)
Rybnoe Khozyaistvo No. 7, 68-69 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 154, Abstract No. 6R275 (June 1973)

Protein/water and protein/water/fat coefficients were determined for certain species of freshwater and marine fish of the Georgian S.S.R. The values of each coefficient were inversely related to the tenderness of the fish meat. There was no correlation between the fat content and the tenderness of the fish meat. FTP

0.38 (6.15) ENZYMIC SOLUBILIZATION OF AN INSOLUBLE SUBSTRATE, FISH PROTEIN CONCENTRATE. PROCESS AND KINETIC CONSIDERATIONS

Archer, Michael C., Jon O. Ragnarsson, Steven R. Tannenbaum, and Daniel I. C. Wang (Dep. Nutr. Food Sci., Massachusetts Inst. Technol., Cambridge, Mass.)
Chemical Abstracts 78, No. 13, 83015t (Apr. 2, 1973)

0.38 (1.3) POLYMORPHISM OF MALATE DEHYDROGENASE ISOENZYMES IN PACIFIC OCEAN SALMON

Siyn'ko, V. I. (Lab. Genet., Inst. Biol. Morya, Vladivostok, U.S.S.R.)
Chemical Abstracts 79, No. 16031c (July 23, 1973)

0.39 (2.9) N-NITROSATION BY NITRITE ION IN NEUTRAL AND BASIC MEDIUM

Keefer, Larry K., and Peter P. Roller (Division of Cancer Cause and Prevention, National Cancer Institute, Bethesda, MD 20014)
Science 181, No. 4106, 1245-1247 (Sept. 28, 1973)

Other reports have suggested that carcinogenic N-nitrosamines can be produced only in acidic medium. In this present report, experimental nitrosation was described in neutral and basic media in the presence of a catalyst. At room temperature, and through the pH range of 6.4 to 11.0, the reaction of diethylamine with sodium nitrite in the presence of formaldehyde yielded appreciable amounts of diethylnitrosamine. Under these conditions, no nitrosamine could be detected above pH 7.5 when formaldehyde was excluded from the reaction. The authors suggest that the high yields under mild conditions of these reactions gives them potential for the synthesis of nitrosamines, especially those involving participating compounds containing acid-labile functional groups. Chloral (an aldehyde) was almost half as active as formaladehyde in catalyzing nitrosation under alkaline conditions. Another aldehyde and acetone were also tested but failed to catalyze nitrosation under alkaline conditions. The authors concluded that catalytic activity is dependent on the structure of the carbonyl compounds used in the experiments. The authors suggest that the mechanism of catalysis involves interaction of the aldehyde with the secondary amine, initially. The intermediate products would then react with the nitrite ion to produce nitrosamine, the end product.

0.39 (2.9) POTENTIAL PRECURSORS OF N-NITROSOPYRROLIDINE IN BACON AND OTHER FRIED FOODS

Bills, Donald D., Kjell I. Hildrum, Richard A. Scanlan, and Leonard M. Libbey (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Agricultural and Food Chemistry 21, No. 5, 876-877 (Sept.-Oct. 1973)

In earlier work, N-nitrosopyrrolidine (NPy) and N-nitroso derivatives of dimethylamine, diethylamine, and piperidine, were isolated from samples of fried bacon. NPy appears to be formed when bacon is fried in a conventional manner but may not be present in raw bacon. The purpose of the present study was to determine the possibility of producing NPy from several possible precursors in a system designed to simulate the frying of foods containing small amounts of water. To simulate the physical conditions of frying bacon, a 200-ml balloon flask was equipped with a reflux condenser. One hundred ml of steam-stripped vegetable oil (mixture of processed soybean and cottonseed oil), 1 ml of water, a boiling chip, an internal standard (40 mg of methyl myristate), and 0.005 mol of the compound to be tested were placed in the flask. The temperature of the contents of the flask was brought to 170° C in 10 min and held at that temperature for 10 min. The use of an internal standard provided a means to compensate for losses of NPy that undoubtedly occurred during distillation, extraction, and concentration without the need to determine percent recovery. Equimolar amounts of the test compound and sodium nitrite were added to the system prior to heating, with the exception of tests on N-nitrosoproline. N-nitrosoproline, pyrrolidine, spermidine, proline,

0.31 (1.9)(1.92) FISH OILS. V. PHOSPHOLIPID COMPOSITION OF ANGUILLA VULGARIS AND MUGIL CEPHALUS

Shoeb, Z. E., F. M. Salama, and A. S. El-Nockrashy (Fats Oils Lab., Natl. Res. Cent., Cairo, United Arab Republic)
Chemical Abstracts 79, No. 5, 29591k (Aug. 6, 1973)

0.39 (2.9)

Since formaldehyde is widely distributed, significant environmental synthesis of nitrosamines must now be considered possible in nonacidic media. For example, formaldehyde is abundant in smoke used for smoking ham and fish, two products which have been reported to contain dimethylnitrosamine. A number of other aldehydes which might have the property of catalyzing nitrosation could be present in foodstuffs and in the environment. The authors suggest to those investigators studying environmental nitrosation the following points: (1) descriptions of nitrosation by enzymatic syntheses must demonstrate, not assume, the absence of catalysis in a boiled medium; (2) estimates of in vivo nitrosamine yields on the basis of data from in vitro model systems must consider the possibility of catalysis by aldehydes of nitrosation in gastric contents and other acidic media; and (3) the intermediate compounds produced by the initial catalytic reaction of aldehyde with compounds other than secondary amines should be considered as possible sources of nitrosamines.

[1 figure, 32 references] SW

0.33 DISCOLORATION OF AUTOXIDIZED LIPID BY THE REACTION WITH VBN [VOLATILE BASIC NITROGEN] OR NON-VBN FRACTION FROM FISH MUSCLE

Nakamura, Takashi, Kazuto Yositake, and Masamichi Toyomizu (Lab. Fish. Technol., Kyushu Univ., Fukuoka, Japan)
Chemical Abstracts 79, No. 13, 77126j (Oct. 1, 1973)

0.39 (2.9)

and putrescine produced N-nitrosopyrrolidine in yields of 2.6, 1.0, 1.0, 0.4, and 0.04% of the theoretical yield, respectively. Glutamine, glutamic acid, and hydroxyproline did not produce N-nitrosopyrrolidine under conditions of the test.

[1 table, 6 references] FTP

0.36 (3.239) MUSCULAR PROTEINS OF FISH. XI. EFFECT OF FREEZING OF DENATURATION OF ACTOMYOSIN ATPASE FROM CARP MUSCLE

Arai, Kenichi, and Reiji Takashi (Fac. Fish., Hokkaido Univ., Hakodate, Japan)
Chemical Abstracts 79, No. 7, 41067b (Aug. 20, 1973)

0.36 (1.69) CHANGES IN BLOOD GLUCOSE IN PLEURONECTES PLATESSA FOLLOWING CAPTURE FROM THE WILD. STRESS REACTION

Wardle, C. S. (Mar. Lab., Aberdeen, Scotland)
Chemical Abstracts 79, No. 3, 16036h (July 23, 1973)

0.38 GENETICS OF FISH ISOENZYMES

Salmenkova, E. A. (Inst. Biol. Morya, Vladivostok, U.S.S.R.)
Chemical Abstracts 79, No. 5, 29559f (Aug. 6, 1973)

0.38 HEAT RESISTANCE OF MUSCLES AND OF CHOLINESTERASE OF MUSCULAR HOMOGENATES OF STURGEON, STERLET, AND THEIR HYBRIDS

Kusakina, A. A. (Lab. Comp. Cytol., Inst. Cytol., Leningrad, U.S.S.R.)
Chemical Abstracts 79, No. 5, 29575h (Aug. 6, 1973)

0.39 NITROGEN FIXATION BY ANABAENA CYLINDRICA.
I. LOCALIZATION OF NITROGEN FIXATION IN THE HETEROCYSTS

Weare, N. M., and J. R. Benemann (Dept. Chem., Univ. California, San Diego, CA
Arch. Mikrobiol. 90, No. 4, 322-332 (1973)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 61, Abstract No. 3Q8329f (Aug. 1973)

Subjecting cultures of nitrogen fixing A. cylindrica to blending results in a loss of nitrogenase activity which is correlated with the breakage of filaments at the junctions between heterocysts and vegetative cells. Nitrogen-fixation activity in the dark was less than 50% of activity in light. Nitrogenase activity was lost in about 3 h when cultures of A. cylindrica were incubated aerobically in the absence of light. Reexposure to light resulted in recovery of nitrogenase activity within 2 h. Heterocysts were concluded to be the sites of nitrogenase activity, and a model for nitrogen fixation by A. cylindrica was proposed. SW

0.39 FIXATION OF CARBON DIOXIDE AND SOME OF THE ENZYMES
(0.38) INVOLVED IN COD EGGS

Mounib, M. Said, and Joanne S. Eisan (Halifax Lab., Fish. Res. Board Canada, Halifax, Nova Scotia, Canada)
Chemical Abstracts 79, No. 3, 16089c (July 23, 1973)

0.39 EFFECT OF VINBLASTINE, COLCHICINE, SODIUM, POTASSIUM, AND ADRENALINE ON PIGMENT MIGRATION OF MELANOPHORES IN TEN SPECIES OF TELEOSTS

Junqueira, L. C. U. (Inst. Cienc. Biomed., Univ. São Paulo, São Paulo, Brazil)
Chemical Abstracts 78, No. 21, 132308b (May 28, 1973)

0.39 COPPER AND ZINC LEVELS BEFORE AND AFTER SPAWNING OF
(8.42) ABRAMIS (FISH) OF THE CENTRAL REGION OF THE KUIBYSHEV RESERVOIR

Nazrenko, L. D. (U.S.S.R.)
Chemical Abstracts 79, No. 7, 40127j (Aug. 20, 1973)

0.39 CYTOGENETIC ANALYSIS OF PSEUDOLINKAGE OF LDH
(1.37) [LACTATE DEHYDROGENASE] LOCI IN THE TELEOST GENUS SALVELINUS

Davisson, Muriel Trask, James E. Wright, and Louisa M. Atherton (Dep. Biol., Pennsylvania State Univ., University Park, Pa.)
Chemical Abstracts 79, No. 7, 40202e (Aug. 20, 1973)

0.39 IONIC COMPOSITION OF THE LATERAL-LINE CANAL FLUID
(1.71) OF DOGFISH

Liddicoat, Jennifer D., and B. L. Roberts (Lab. Mar. Biol. Assoc., Plymouth, England)
Chemical Abstracts 79, No. 3, 16045k (July 23, 1973)

0.4 A STIMULATORY APPARATUS FOR STUDYING THE OLFACTORY ACTIVITY
(9.1) IN FISHES

Hara, T. J., Y. M. C. Law, and E. Van Der Veen (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba R3T 2N6, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 283-285 (Feb. 1973)

This paper contains a description of the apparatus and technique to record, for extended periods of time, the electrical response from the olfactory bulbs of fishes. It was successfully used on the olfactory systems of rainbow trout and brook trout, but it could be adapted to other species of fish. The technique would find use, for example, in testing the effects of water-borne pollutants on the olfactory system of fishes.
[3 figures, 3 references] FTP

0.4 ANTIPLASMIC AND ANTIINFLAMMATORY AGENTS FOR
(9.16) PANCREAS NECROSIS CONTROL IN FISH

Inoue, Shinichi (Daiichi Seiyaku Co., Ltd.) (pat.)
Japan. Kokai 73 40,926 (June 15, 1973)
Chemical Abstracts 79, No. 15, 87619m (Oct. 15, 1973)

0.39 METABOLISM OF DIMETHYLNITROSAMINE BY AMPHIBIANS AND FISH IN VITRO

Montesano, R., A. J. Ingram, and P. N. Magee (Cent. Int. Rech. Cancer, WHO, Lyons, France)
Chemical Abstracts 79, No. 13, 74680z (Oct. 1, 1973)

0.4 (1.951) VENTRICULAR DILATATION IN THE DIVING SEAL

Blix, A. S., and R. Hol (Inst. Arait. Med., R. Norweg. Air Force, Blinders, Oslo, Norway)
Acta Physiol. Scand. 87, No. 3, 431-432 (1973)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 92, Abstract No. 3Q8480M (Aug. 1973)

Information on the functional properties of the heart of a diving seal was obtained during an angiographic examination of a harp seal making 10-18 min dives. After 6 min of submersion the angiograms showed that the right ventricle of the heart was strikingly dilated with a large end systolic volume. This condition closely resembles that of humans during acute cardiac infarction. During acute coronary insufficiency in the dog, earlier reports indicate that ventricular dilatation represents the most important compensatory mechanism in the maintenance of cardiac output and external ventricular performance. The authors suggest the reversible ventricular dilatation of the seal may represent an important life-secureing mechanism during dives. SW

0.39 (6.32) SULFATED POLYSACCHARIDES SYNTHESIS IN BROWN ALGAE

Evans, L. V., Margaret Simpson, and Maureen E. Callow (Dep. Plant Sci., Univ. Leeds, Leeds, England)
Chemical Abstracts 78, No. 21, 133402q (May 28, 1973)

0.4 (9.12)(9.6) THE EFFECTS OF PRESSURE ON ORGANISMS

Sleigh, M. A., and A. G. MacDonald (editors)
Cambridge University Press, London (1972), xii + 516 pp. Price £8.
Frank H. Johnson (reviewer)
Nature 245, No. 5422, 223-224 (Sept. 28, 1973)

The 24 articles and 3 abstracts in this book are based on papers given at the 26th Symposium of the Society for Experimental Biology in 1971. Topics range from basic aspects of physics and physical chemistry of increased pressures to the effects of pressure on molecular systems and such complex processes as adaptation and vertical migratory behavior of fishes. Physiological processes of marine and terrestrial animals (including man) under pressure are included. Many opportunities for research are described in the book with emphasis on studies of animals indigenous to the deep sea. SW

0.5 (1.81) MICROBIAL FLORA AND LEVEL OF VIBRIO PARAHAEMOLYTICUS OF OYSTERS (CRASSOSTREA VIRGINICA), WATER AND SEDIMENT FROM GALVESTON BAY

Vanderzant, C., and C. A. Thompson, Jr. (Dept. of Animal Science, Texas Agricultural Experiment Station, College Station, TX 77843), and S. M. Ray
Journal of Milk and Food Technology 36, No. 9, 447-452 (Sept. 1973)

V. parahaemolyticus in oysters has been isolated from widely different marine environments in the United States, Japan, and countries bordering the Baltic Sea. The organism has been implicated in outbreaks of gastroenteritis in association with consumption of seafood. The potential of oysters in contributing to foodborne illness was evaluated. Experiments were performed to determine the level and type of bacterial flora in oysters; and the distribution of V. parahaemolyticus in oysters, water, and sediment from Galveston Bay, Texas, was investigated.

The results indicate that the aerobic plate counts of dilutions of freshly harvested oysters incubated at 25° C ranged from 2.3×10^4 to 3.0×10^7/g; those of sediment samples ranged from less than 10^2 to 3.0×10^6/g; and counts of water samples were less than 10^2/ml. Species of Vibrio, Aeromonas, and Moraxella predominated in the oyster samples. V. parahaemolyticus was isolated from 39 of 66 oyster samples, and 9 of 30 sediment and water samples. The organism was found in only one of eight refrigerated oyster samples taken from retail markets. In addition, Aeromonas and Moraxella species predominated in the oysters taken from these markets.

[4 figures, 5 tables, 33 references] SW

1.951 (9.17) THE STATUS OF COMMON SEALS IN SHETLAND

Bonner, W. N., R. W. Vaughan (Seals Research Division, Institute for Marine Environmental Research, Natural Environment Research Council, Fisheries Laboratory, Lowestoft, Suffolk, England), and L. Johnston
Biological Conservation 5, No. 3, 185-190 (July 1973)

A small-scale sealing industry has been operating for a long time in the coastal waters of the Shetland Islands. Before 1960, 300 to 400 seals, mostly pups, were killed annually. Between 1962 and 1968, the number of young seals killed annually rose to 900, exclusive of adults. Interest in maintaining the stock of seals was expressed by those concerned, including the hunters, who believed that the stock was declining. The major cause of the decline was attributed to the high level of pup killing. In actions to conserve the stock, the most important skin dealer made no purchases in 1968, and one of the principal hunters gave up sealing.

To investigate the status of the Shetland common seal, a search was made at various sites on the coastline of the islands in 1971. Counts were made at each site, and the total number was found to be 1,219 seals. Due to the uncertainty of the actual count because of seals at sea or the possibility of counting the same seals twice, the authors estimated the population to lie between 1,500 and 2,500 animals. The authors were inclined to rely on the opinions of the hunters and boatmen who expressed the belief that the seal population was declining, but the rate of decline was unknown.

[2 figures, 4 tables, 4 references] SW

1.87 (1.0115)(9.6) LOBSTERING INSHORE AND OFFSHORE

Doliber, Earl L. (Marblehead, Mass.)
International Marine Publishing Co., Camden, Me. (Aug. 1973), 108 pp. Price $5.95.

This book is a brief description of the inshore and offshore lobster (Homarus americanus) fishery of the northeast coastal area of the United States. The six chapters deal with the natural history of the lobster, history of lobster fishing, the men and equipment, inshore and offshore fishing methods, the fishing grounds, and the prospects for the future. The book contains many illustrations, has a glossary of terms, and contains a bibliography of 29 references. FTP

2.00 (1.85) CHEMICAL CHARACTERISTICS, BACTERIAL COUNTS, AND POTENTIAL SHELF-LIFE OF SHRIMP FROM VARIOUS LOCATIONS ON THE NORTHWESTERN GULF OF MEXICO

Cobb, B. F., III, C. Vanderzant, C. A. Thompson, Jr., and C. S. Custer (Dept. of Animal Science, Texas Agricultural Experiment Station, College Station, TX 77843)
Journal of Milk and Food Technology 36, No. 9, 463-468 (Sept. 1973)

Results of earlier work indicate that each species of bacteria isolated from shrimp produces its own pattern of spoilage in refrigerated shrimp. Increased levels of trimethylamine (TMA) are associated with quality deterioration and are considered to be due to bacterial modification of trimethylamine oxide (TMAO). The report of N. K. Velankar and T. K. Govindan ["Trimethylamine Oxide Content of Marine Prawns Occurring in the Back Waters and in the Sea Off Cochin," Proc. Indian Acad. Sci. 52B, 111-115 (1960)] indicated that the TMAO content of shrimp taken from brackish water was lower than in shrimp taken from salt water. The authors suggest that differences in the chemical and microbiological characteristics of the aquatic environment and of the shrimp taken from these areas could influence the shelf life of iced shrimp. A study was conducted to determine the changes, during iced storage, in chemical characteristics and bacterial counts of shrimp taken from different locations in the northwestern Gulf of Mexico.

The samples tested were from freshly harvested white shrimp taken in 13 locations in the Gulf of Mexico; freshly harvested brown shrimp taken from three different depths of water near Port Aransas, Texas; and brown shrimp taken from commercial fishing boats at the time of landing. Analyses were made on the samples

1.95 (9.125) FUNCTIONAL ANATOMY OF MARINE MAMMALS. VOLUME 1.

Harrison, R. J. (editor)
Academic Press, London (1972), xvi & 451 pp. £7.50.
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 55, Abstract No. 3Q8303M (Aug. 1973)

This book contains articles by specialists on the growth and development of marine mammals; observations on seal skulls; comparative anatomy of the whale, dolphin, and porpoise; observations on the eye of the seal and walrus; anatomy of the seal ear; underwater hearing in seals--functional morphology; comparative anatomy of the hind limbs of the river otter, sea otter, and seals; and reproduction and gonadal appearances of toothed whales. SW

1.959 (9.15) VENOM OF THE YELLOW-BELLIED SEA SNAKE (PELAMIS PLATURUS). PHYSICAL AND CHEMICAL PROPERTIES

Shipman, W., H., and G. V. Pickwell (Nav. Undersea Cent., San Diego, Calif.)
Chemical Abstracts 79, No. 15, 89749c (Oct. 15, 1973)

0.8 (3.2344) NON-STEADY HEAT TRANSFER IN A FREEZING MODEL SUBSTANCE

Geuze, C. A., and A. Betten (Tuber, S., Grenco N. V., 's-Hertogenbosch, Netherlands)
Chemical Abstracts 78, No. 26, 161396j (July 2, 1973)

0.6 (9.2)(9.6) A GUIDE TO PRACTICAL TECHNOLOGICAL FORECASTING

Bright, James R., and Milton E. F. Schoeman (editors)
Prentice-Hall Inc., Englewood Cliffs, N.J. (n.d.), 651 pp. Price $49.95.

The purpose of this book is to bring together new information on technological forecasting flowing from industry, government, and academia during the last 5 years. It contains contributions from more than 40 experts in the field. The book is divided into five parts: (1) Toward Improvement of Technological Forecasting, (2) Advances in Technological Forecasting Techniques, (3) Technological Forecasting Applied to Current Problems, (4) Expanding the Scope of Technological Forecasting, and (5) Organizing for Technological Forecasting. The book contains discussions of several new forecasting theories and concepts, and it includes a number of actual forecasts to show what can be done with forecasting techniques. FTP

2.00 (1.85)

for amino nitrogen (AA-N), ammonia, total volatile nitrogen (TVN), trimethylamine nitrogen (TMN), bacterial count, and pH. Of the samples that were placed on sterile ice, spoilage odors were sensed: after 11 to 15 days in white shrimp, after 20 to 30 days in brown shrimp, and after 0 to 15 days in brown shrimp from commercial fishing boats (boat-shrimp). TVN and AA-N varied from sample to sample and did not show a consistent pattern of change during iced storage. Most of the TVN consisted of ammonia nitrogen. The TVN/AA-N ratios increased as the samples spoiled. The pH of the spoiled samples was relatively high, 7.8-8.0. The bacterial counts of fresh shrimp were not above 10,000/g. Nine of ten boat-shrimp samples had counts in excess of 1 million/g. The authors estimated that the maximum potential shelf life of boat-shrimp was reduced 0 to 15 days by contamination during handling and storage.
[6 tables, 9 references] SW

2.1126 (2.1476) COMPARISON OF SALMON CATCHES IN MONO- AND MULTIFILAMENT GILL NETS

Washington, Percy (National Marine Fisheries Service, NOAA, Northwest Fisheries Center, Seattle, WA 98102)
Marine Fisheries Review 35, No. 8, 13-17 (Aug. 1973)

Mono- and multifilament gill nets of the same mesh sizes were comparatively fished from the RV George B. Kelez for Pacific salmon, Oncorhynchus spp., and steelhead trout, Salmo gairdneri, in the Gulf of Alaska and North Pacific Ocean during the winter, spring, and summer of 1971. Catches were analyzed by catch per unit of effort (CPUE), species composition, and length composition of the fish. Relative efficiencies of mono- and multifilament gill nets varied considerably by season, species, and mesh size, but monofilament gill nets were generally more efficient with the CPUE 2.2 times that of multifilament nets. The species composition of salmon catches in mono- and multifilament gill nets in spring and summer were different owing to a higher percentage in multifilament nets of chum salmon, O. keta, in spring and of chum and coho salmon, O. kisutch, in summer. Means and/or variances of length were, in general, statistically different; monofilament-caught fish were generally slightly larger.
[3 figures, 4 tables, 5 references] Author's abstract

2.01 (1.4) IDENTIFICATION OF THE VOLATILE COMPOUNDS PRODUCED IN STERILE FISH MUSCLE (SEBASTES MELANOPS) BY PSEUDOMONAS FRAGI

Miller, A., III, R. A. Scanlan, J. S. Lee, and L. M. Libbey (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Applied Microbiology 25, No. 6, 952-955 (June 1973)

Earlier workers reported a fruity or esterlike odor that commonly developed in chilled fish muscle during the early stages of spoilage. The same odor was produced in sterile fish tissue by bacterial cultures isolated from fish. The isolate was identified as P. fragi, a psychrophilic organism which can use a variety of amino acids in odor production. An investigation was performed to identify the volatile compounds (including those responsible for the fruity odor) produced by P. fragi in black rockfish muscle.

Sterile fish muscle tissue was homogenized and inoculated with P. fragi strain 18. The sterile homogenate was also supplemented with 0.2% ethanol and inoculated. All samples were incubated at 5°, 15°, and 25° C and checked for odor periodically. When the fruity odor was pronounced, the homogenates were analyzed by combined gas-liquid chromatography and mass spectrometry. The fruity odor was produced in fish muscle at all incubation temperatures. It developed more rapidly at 25° C and was gradually superseded by a sulfide odor. No typical amine odor was apparent. In fish homogenate supplemented with ethanol and incubated at 15° C, the volatile compounds were methyl mercaptan, dimethyl sulfide, acetaldehyde, ethyl acetate, ethanol, ethyl butyrate, butanone, dimethyl sulfide, and ethyl hexanoate. The fruity odor was attributed to a synergistic flavor interaction involving ethyl acetate, ethyl butyrate, and ethyl hexanoate. The strong sulfide odor that was increasingly

2.03 (0.38) ACTIVITY OF MUSCULAR CATHEPSINS OF SOME MARINE FISHES

Fik, Mirosław (Institute of Fish Processing Technology)
Acta Ichthyologica et Piscatoria 2, No. 2, 105-110 (1972) (Szczecin, Poland)

Endogenous proteolytic enzymes may play an important role in the decomposition of fish. In this study, therefore, the author examined the activity of the muscle cathepsins of seven species of marine fish. The species used were cod, plaice, mackerel colias, hake, jackfish, brill, and herring. The enzyme was extracted from the fish muscle with 1% KCl. The activity of the cathepsins was determined by Anson's method [H. U. Bergmeyer, Methods of Enzymatic Analysis, Academic Press, New York (1965)] as modified by the author.

Of the fish from the Baltic Sea (cod, herring, plaice, brill), the muscle of the brill contained the most active cathepsin. Of the fish from the West African fishing grounds (hake, jackfish, mackerel colias), the muscle of the hake had the most active cathepsin. The cathepsins of the pelagic fish were less active than those of the fish from deeper waters.
[3 tables, 10 references] FTP

2.05 (0.5)(1.81) SURVIVAL OF VIBRIO PARAHAEMOLYTICUS IN OYSTER SHELLSTOCK AT TWO DIFFERENT STORAGE TEMPERATURES

Johnson, W. G., Jr., A. C. Salinger, and W. C. King (Maryland State Department of Health and Mental Hygiene, Baltimore, MD 21218)
Applied Microbiology 26, No. 1, 122-123 (July 1973)

A study was performed to determine the survival of V. parahaemolyticus in oyster shellstock (Crassostrea virginica) taken from an inlet, Fishing Bay, of Chesapeake Bay. Within 4 h of harvest, the oysters were divided into three lots: one lot was examined immediately, one was held at 35° C, and one was stored at 4° C. In the procedure to isolate the microorganism, the oysters and their liquor were blended with sterile 1% Trypticase soy broth (TSB) containing 3% NaCl. Serial tenfold dilutions were made to a concentration of 10^{-6} using as a diluent 1% TSB containing 3% NaCl. The dilutions and inoculated plates of thiosulfate-citrate-bile salt-sucrose agar were incubated at 35° C for 24 h. The colony isolates were tested by the methods of M. Fishbein, I. Mehlman, and J. Pitcher [Appl. Microbiol. 20, 176-178 (1970)] and the Food and Drug Administration [Bacteriological Analytical Methods, Washington, D.C. (1969)].

V. parahaemolyticus was found in the oysters harvested in January, February, April, May, September, and October. In the oysters held at 4° C, the microorganism survived for 3 weeks with no decrease in numbers; growth occurred for 2 to 3 days when the oyster samples were held at 35° C. In the lower dilutions, loss of V. parahaemolyticus occurred when other organisms were present in large numbers.
[2 tables, 8 references] SW

2.1 NOON SIGHT NAVIGATION; SIMPLIFIED CELESTIAL

Birney, Arthur A.
Cornell Maritime Press, Cambridge, Md (1972), 48 pp. Price $3.00.

This booklet is intended for a reasonably experienced skipper who has not learned complete celestial navigation. In the event of the navigator's sudden incapacitation, the procedures described in the booklet will bring both ship and crew back safely to port. The advantages of the system are simplicity and speed. Its major fault is that it can be used only one time during the day, at local apparent noon, when the sun is at its highest. If the sun or the horizon are obscured at that moment, the opportunity for a noon sighting is lost until the next day. SW

2.03 (0.38) OPTIMAL CONDITIONS FOR AUTOLYSIS OF JACK FISH MUSCLES TRACHURUS TRACHURUS (L.)

Fik, Mirosław (Institute of Fish Processing Technology)
Acta Ichthyologica et Piscatoria 2, No. 2, 113-118 (1972) (Szczecin, Poland)

In this study, the author examined the rate of autolysis of jackfish muscle under various pH and temperature conditions. The pH levels tested were 3.6, 4.0, 4.4, 4.8, and 5.2. The incubation temperatures used were 0°, 10°, 20°, 30°, 40°, and 50° C. The degree of autolysis was estimated by the increase in amino nitrogen as determined by formalin titration. The results indicated that the autolytic decomposition of jackfish muscle is most intense at pH 3.6-4.4 and at a temperature of about 40° C.
[2 figures, 3 tables, 6 references] FTP

2.1 (1.951) CRACKERS A DETERRENT FOR SEALS

Anonymous
S. Afr. Shipp. News. Ind. Rev. 27, No. 11, 47-49 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 219, Abstract No. 3Q9118M (Aug.1973)

Experiments were performed in the use of firecrackers to drive seals away from purse seine catches. The results show that when the firecrackers were exploded underwater the seals left the nets but returned in a few minutes. The seals did not appear to become accustomed to the crackers. If the pursing operation takes 15 to 20 min, it would require about five crackers to repel seals during pursing. The crackers could also be used to control fish movement. Recordings of crackers could be used to drive off seals but not disturb the shoal fish. SW

2.01 (1.4)

evolved during continued incubation was identified as a combination of methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. The bacterial culture used in this experiment was obtained from the Torry Research Station, Aberden, Scotland. A strain of P. fragi, obtained from Oregon State University and inoculated into fish muscle, was unable to produce fruity odors. The authors suggest that strong, fruity odors are characteristic of new isolates of P. fragi, but the ability to produce esters is easily lost by continued subculturing. P. fragi strain 18 inoculated into sterile, homogenized milk supplemented with 0.2% ethanol also produced a fruity aroma. The compounds responsible for the aroma were identified as ethyl butyrate and ethyl hexanoate. The authors suggest that the kinds and quantities of esters produced by the organism can be influenced by the substrate. The data indicate that P. fragi is responsible for fruity odor spoilage of fish and dairy products.
[1 figure, 1 table, 17 references] SW

2.19 (1.2) [PRESERVATION OF ANCHOVY ON BOARD THE FISHING VESSELS CAUGHT FOR FISH MEAL INDUSTRY] PRESERVACIÓN DE LA ANCHOVETA A BORDO DE LAS EMBARCACIONES PESQUERAS, CON FINES INDUSTRIALES DE REDUCCIÓN

Lam, R. C., E. C. Icochea, and J. T. Sãnchez (Inst. Mar., Callao, Peru)
Documenta. Organo Inf. Tech.-Cient. Minist. Pesq., Peru 2, No. 15, 36-47 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 6, 242, Abstract No. 3Q6787M (June 1973)

There is an 11% weight loss in the catch of fishmeal anchoveta after they are landed. The loss is caused by blood decomposition. The loss occurs mainly at factory warehouses, and it is significant because the total annual catch is 8 to 9 million tons. An investigation was carried out to determine methods of preserving the catch on the fishing boats. Preservation compounds were found to preserve the fish in the following order of effectiveness: 250 g $NaNO_2$ + 1 liter 37% formalin per ton of fish; modified INH solution (a proprietary liquid of unstated composition) 2 liter per ton of fish; 200 g $NaNO_2$ + 0.87 liter formaldehyde per ton of fish; and Na benzoate plus formaldehyde (250 p/m and 400 p/m, respectively). Further studies are needed in the industrial application of this information. SW

2.05 GROWTH AND TOXIN PRODUCTION OF CLOSTRIDIUM BOTULINUM TYPE E IN FISH PRODUCTS. IV. EFFECT OF FISH EXTRACTS ON SPORE GERMINATION

Ando, Yoshiaki, Shigemi Oka, and Keiichi Oishi (Hokkaido Inst. Public Health, Japan)
Chemical Abstracts 79, No. 15, 89274u (Oct. 15, 1973)

2.113 LEACHING MECHANISM OF CUPROUS OXIDE FROM ANTIFOULING PAINTS

De la Court, F. H., and H. J. De Vries (Paint Res. Inst., TNO, Delft, Netherlands)
Chemical Abstracts 79, No. 16, 93506p (Oct. 22, 1973)

2.114 MAINTENANCE OF SMALL MARINE ENGINES

Cuttell, A. O. (Lister Blackstone Pty., Ltd., Revesby, New South Wales, Australia)
Australian Fisheries 32, No. 6, 30-31 (June 1973)

This article lists the tasks, as a general guide for operators, in the maintenance of small marine diesel engines. The engine manufacturer's instruction manual should be preserved in such a manner as to remain readable for providing instructions specific to a particular engine.

In daily maintenance--check fuel supply and condition and level of oil in engine, gearbox, and reduction gearbox, if fitted. Check levels of fluid in hydraulic-powered equipment. Check water level in header tank of heat exchanger. Wipe engine over with a clean cotton rag.

Every 100 h--examine and clean, if necessary, the air cleaner; check all fuel and oil lines for leaks; check battery terminals and acid level.

Every 250 h--remove lubricating oil and refill; remove injectors, if necessary, for cleaning and resetting; check auxiliary drive belts and check tension; check gearbox for leaks and tighten bolts, if necessary.

Every 500 h--adjust tappet clearances; wash engine down with clean fuel oil or kerosene; renew lubricating oil filter; lubricate generator bearing; remove cylinder heads and decarbonize, if necessary; clean inlet and exhaust manifolds; reinstall heads correctly.

Every 1,000 h--renew air cleaner elements; clean heat exchanger, if fitted; if air cooled, clean cooling fins, fan, and oil cooler; check raw-water impeller; check tailshaft alignment; replace oil in gearboxes.

2.119 SHIPWRECK AND SURVIVAL

Miles, S. (University of Manchester, Manchester, United Kingdom)
Proc. R. Soc. Edinb. B, No. 73, 97-102 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 8, 5, Abstract No. 3Q8061 (Aug. 1973)

The factors concerned with survival after shipwreck include: the actual moment of crisis; abandoning ship; death by drowning, hypothermia, or sharkbite; and the influences of thirst, hunger, and exposure on survival in a life boat or raft.

SW

2.1474 RESULTS OF COMPARATIVE TRAWL AND TRAP FISHING
(2.1471) OFF OREGON FOR SABLEFISH, ANOPLOPOMA FIMBRIA

Parks, Norman B. (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Boulevard East, Seattle, WA 98112)
Marine Fisheries Review 35, No. 9, 27-30 (Sept. 1973)

A comparison of catches taken in trawls and traps fished at the same time and location off northern Oregon indicated that the traps were more selective for sablefish. Moreover, the trap-caught sablefish averaged 5.2 inches longer than, and were twice as heavy as the trawl-caught sablefish (average fork length 21.0 inches, average weight 3.4 lb). The percentage of marketable sablefish (4 lb or heavier) in the trap catches was 93.3 percent, but only 57.2 percent in the trawl catches.

[2 figures, 3 tables, 6 references] Author's abstract

2.114

Every 1,500 h--drain and clean fuel tank; renew fuel filter; clean and adjust injector nozzles; check and adjust fuel pump timing; check governor linkage; check water spaces in cylinder blocks, cleaning sludge out, if necessary.

Every 3,000 h--check turbocharger bearings for wear; check cooling fan bearings for wear.

Every 6,000 h--check main bearings for wear; inspect camshaft bearings; renew valve springs; check output shaft bearings of gearboxes for end play; check propeller shaft alignment at the engine drive coupling.

By adhering to scheduled checks and renewals, long and trouble-free engine life will be ensured. SW

Lennartz, Gustav, and Emil Michel (Forschungsinst., Dtsch. Edelstahlwerke A.-G., Krefeld, Germany)
Chemical Abstracts 79, No. 16, 95495h (Oct. 22, 1973)

2.117 DEVELOPMENT AND PROPERTIES OF NONMAGNETIZABLE CORROSION-RESISTANT, AND SEA WATER STABLE STEELS WITH INCREASED 0.2% OFFSET YIELD STRENGTH. II. CORROSION PROPERTIES

2.1478 (9.17) UNDERWATER OBSERVATIONS ON TRACKS OF DREDGES AND TRAWLS AND SOME EFFECTS OF DREDGING ON A SCALLOP GROUND

Caddy, J. F. (Dept. of the Environment, Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 173-180 (Feb. 1973)

Earlier work by the author and his colleague indicated that tracks made by clam dredges may persist for several days on sand and for longer periods on mud. The author also showed that the scallop dredge has a low efficiency and may cause appreciable incidental mortalities of scallops that attract predators into the dredge tracks. In the present study, the author attempted to quantify some of the incidental effects of fishing (dredging and trawling) over a scallop ground.

Using a submersible in Chaleur Bay (Gulf of St. Lawrence), the author saw tracks of three types of fishing gear (otter trawl, and inshore and offshore dredges) in the bottom sediments. Tracks left by earlier otter trawling covered about 3% of the bottom area; the tracks were probably made by the trawl doors. Apparently, inshore and offshore scallop dredging appreciably roughens the bottom--fine sediments are lifted into suspension, gravel is buried below the sand surface, and large rocks embedded in the sediment are overturned. One design of inshore scallop dredge appears to be inefficient because it dumps its contents back onto the bottom at intervals during the tow. Dredging causes appreciable sublethal and lethal damage to the scallops left in the tracks. Incidental mortalities to scallops with an offshore dredge are about 13% to 17%. Predatory fish and shellfish appear in the dredge tracks within 1 h of fishing; the author found them present in densities of 3 to 30 times that outside the tracks.
[5 figures, 4 tables, 15 references] FTP

2.113 BEHAVIOR OF ANTIFOULING PAINTS. V. EFFECT OF POISONS ON ALGAE AT THE WATERLINE

Rascio, Vicente J. D., and Ricardo O. Bastida (Dep. Anal. Ensayo Mater., Lab. Ensayo Mater. Invest. Technol., La Plata, Argentina)
Chemical Abstracts 79, No. 16, 93487h (Oct. 22, 1973)

2.113 ZINC-RICH ORGANIC SYSTEMS EXPOSED FIVE YEARS TO A MARINE ATMOSPHERE

Brouillette, Carl V. (Nav. Civ. Eng. Lab., Port Hueneme, Calif.)
Chemical Abstracts 79, No. 16, 93498n (Oct. 22, 1973)

2.114 (2.113) WATER SYSTEM OF BOILERS FED WITH SOFTENED SEA WATER

Makinskii, I. Z., K. M. Abdullaev, V. V. Shishchenko, and K. A. Bragina (Azerb. Inst. Nefti Khim. im. Azizbekova, Baku, U.S.S.R.)
Chemical Abstracts 79, No. 16, 96798w (Oct. 22, 1973)

2.114 MANGANESE- AND ALUMINUM-CONTAINING BRONZE (2.117)

Takahashi, Michio, Ichiji Nakano, and Takumi Sakai (Kobe Steel, Ltd., Japan) (pat.)
Japan 71 42,304 (Dec. 13, 1971)
Chemical Abstracts 79, No. 16, 95935b (Oct. 22, 1973)

2.3 CRAB PICKING MACHINE

Rodgers, Nellie H., William P. Hunt, and Richard T. Wenstrom (Hampton, Va.); Sea Savory, Inc. (Cambridge, Md.) (pat.)
U.S. Patent 3,750,234 (Aug. 7, 1973)

This crab picking machine has an endless, cleated conveyor belt that inclines upwardly. The cooked crabs are carried upwards to the discharge end and are dropped onto a perforated shaker screen. The impact of the fall breaks up the crab; the meat and waste fall through the screen onto another endless conveyor belt for sorting. The large pieces of crab then return to the elevator conveyor belt for another pass through the system. FTP

2.3 DYNAMIC SANITATION IN THE FISH AND SEAFOOD INDUSTRY
(3.18)

Pedraja, Rafael R. (Booth Fisheries Div., Consolidated Foods Corp., Chicago, IL 60606)
Food Technology 27, No. 10, 42, 44, 72 (Oct. 1973)

The food industry has been giving increasing attention to cleanliness and sanitation in manufacturing plants, handling of raw ingredients, and finished products. Four factors are involved in the increased interest in sanitation: consumer awareness in the area of food quality and safety, increasing activities of regulatory agencies in plant inspections, the food industry's own efforts to improve plant cleanliness and product quality, and the impact of professional food scientists on their companys' processing practices. In good plant sanitation bacteriologically acceptable products are handled in a hygienic manner in a satisfactory environment. Products made under these conditions result in repeat purchases by consumers and a secure market for the processor.

Sanitation requires complete and continuous involvement of management and plant personnel; it starts with physical surroundings (of a plant) and ends when the product is packed and stored. Sanitation encompasses the areas of: plant layout; raw ingredients; processing techniques; processing equipment; packaging; storage conditions; cleaning procedures; cleansing agents; pest control; microbiological testing; environmental control; sanitary inspections; personnel; supervision; personnel habits, training, and attitudes; and management understanding and support.

2.3 QUALITY AND STORAGE LIFE OF ICED TROUT
(2.4)(1.92)

Hansen, Poul (Technological Laboratory, Ministry of Fisheries, Technical University, 2800 Lyngby, Denmark)
Årsberetning fra Fiskeriministeriets Forsøgslaboratorium for 1972, København, Denmark)(1973), pp. 42-49.

Most of the trout produced in Danish trout farms are exported. Most exported trout are either iced or frozen. The storage life of iced trout is relatively short. An investigation was performed to assess the relative importance of fat oxidation, microbiological spoilage, and autolysis by muscle or gastric enzymes in the quality and storage life of iced trout.

Rainbow trout of about 200 g in weight were bled, gutted, and washed. The gutted trout were held for 1 min in a cold 0.5% aqueous solution of ascorbic acid. Except for controls, the fish were then vacuum packed in films of either polyethylene, polyamide, or saran-coated polyester/polyamide laminate. The trout were buried in wet ice. At intervals of a few days, samples of trout wrapped in each of the packaging materials, and the controls, were given microbiological, chemical, and organoleptic analyses.

The results indicate that whole, ungutted trout stored on ice deteriorated in less than 1 week due to the action of visceral enzymes. Unwrapped, gutted trout showed rancidity within 1-1½ weeks. In this period, vacuum packed, gutted trout showed no or slowly developing rancidity depending upon the oxygen

2.6 MARKETING PRACTICES OF WHOLESALERS HANDLING FISH IN THE
(3.26)(3.337) AKRON AND CLEVELAND AREAS

Konopa, Leonard J. (College of Business Administration, Kent State University, Kent, OH 44242)
Marine Fisheries Review 35, No. 9, 31-37 (Sept. 1973)

The results of an exploratory survey in 1971 among seafood wholesalers in northeastern Ohio are reported. The most widely handled product was frozen fish; canned fish was the next product most widely handled. The seafood product handled the least by wholesalers was fresh fish; it was offered by 10 of the 13 major wholesalers but by only 1 of the 12 minor wholesalers. Two-thirds of the wholesalers handling fresh and frozen fish marked up the prices of these products equally while the other third marked up the price of fresh fish more than frozen fish. Domestically, Boston and Gloucester were the basic sources of finfish. The Gulf Coast States provided mostly shellfish. California and Washington were the primary sources of canned fish. Canadian sources supplied the largest amount of fresh and frozen marine and freshwater fish of foreign origin. Promotional methods used by the wholesalers were divided into four categories: inducements to resellers (special prices, display aids, other offers); pressure on salesmen and resellers (sales contests, commissions, telephone sales); other advertising forms (bulletins, flyers, yellow pages); and no promotion. Of the major line wholesalers, 23% engaged in no promotion. Major line wholesalers were equally divided in their preference for fresh or frozen fish; minor line wholesalers unanimously preferred frozen fish. The problems of the wholesalers included spoilage (of

2.3 (2.4)(1.92)

permeability of the packaging film. Tight packing, obtained by the vacuum treatment, keeps the belly flaps together and prevents rapid oxidation of these surfaces. Vacuum packed trout was stored for 2 weeks without showing deterioration. Microbiological spoilage occurs in the third week of iced storage. The storage of trout may be extended to more than 3 weeks by the following treatment: an ascorbic acid dip, vacuum packing, and an irradiation dose of 50-200 krads. [4 figures, 4 tables, 2 references] SW

2.6 (3.26) (3.337)

fresh fish); high cost of labor in processing fish; inadequate supply, transportation, and poor quality of fresh fish; breakage of packages; and inadvertently thawed frozen fish. Lack of consumer demand was the prime reason given by the wholesalers for not handling the underutilized species. While the wholesalers were willing to handle a species if they could realize a profit; they were reluctant to popularize the underutilized species (which would make them profitable). [1 illustration, 5 tables] SW

2.3 [BEHAVIOUR AND PRACTICAL EVALUATION OF FRYING FATS]
VERHALTEN UND BEURTEILUNG VON FRITTIERFETTEN IN DER PRAXIS

Zeddelmann, H., and J. Wurziger (4994 Pr. Oldendorf, Vortella Inst., Federal Republic of Germany)
Fette Seifen, Anstrichmittel 75, No. 1, 18-24 (1973) (In German)
Food Science and Technology Abstracts 5, No. 6, 110, Abstract No. 6N265 (June 1973)

Oils rich in polyenoic acids and animal fats are unsuitable for prolonged use in frying. A new rapid test (the Fritest) to determine the degree of oxidative deterioration in frying-plant oils is described. FTP

2.3 CUTTLEFISH PROCESSING

Daiwa Kasei KK (pat.)
Japanese Patent 7302200
Food Technology 27, No. 9, 114 (Sept. 1973)

Enzymes are used to separate skin and membranes from cuttlefish meat. FTP

2.3 (3.18)

In preserving freshness of seafood, three factors must be considered in retarding undesirable changes during handling and processing: time, temperature, and cleanliness. The raw materials must be handled and processed as rapidly as possible from the time of capture until they are packed and stored. The recommended temperature during all operations, until final preservation is accomplished, is a maximum of 40° F. Strict sanitary rules must be followed to avoid contamination from sources external to the food product and to minimize growth of bacteria already present. A good plant manager must understand the significance of total plate counts, the presence of E. coli, Salmonella, botulism, and sanitation and quality as he understands statements of profit and loss, return on investment, production rates and efficiency standards. Quality assurance programs can act in a truly functional manner when they are separated from production directives, but quality assurance and production should work together in harmony for achieving the company goals of a profitable enterprise and good-quality products. [2 references] SW

2.3 CUTTLEFISH-CHEESE PRODUCT

Horii, J. (pat.)
Japanese Patent 7302336
Food Technology 27, No. 9, 114 (Sept. 1973)

Skinned cuttlefish flesh is soaked in seasoned liquid containing α-starch, stretched, and then rolled to form a sheet. Cheese is spread between two of the sheets, and the product is then press heated and cut. FTP

2.9 FORMATION OF NITROSAMINES IN A MEAT CURING MIXTURE

Sen, N. P., W. F. Miles, Barbara Donaldson, T. Panalaks, and J. R. Iyengar (Food Research Laboratories, Health Protection Branch, Ottawa K1A OL2, Canada)
Nature 245, No. 5420, 104-105 (Sept. 14, 1973)

Trace amounts of N-nitrosamines (carcinogens) have been found in certain foods, particularly nitrite-treated meat and fish products. These compounds may be formed by reaction of nitrite and secondary or tertiary amines. W. Fiddler, J. W. Pensabene, R. C. Doerr, and A. E. Wasserman [Nature 236, 307 (1972)] demonstrated that certain naturally occurring quaternary ammonium compounds can also react with nitrite to form nitrosamines. Dimethylnitrosamine (DMN) and nitrosopyrrolidine (NPy) have most frequently been found in cured meat products. During a monitoring survey of meats, the researchers noted a consistent occurrence of fairly high levels of NPy in Mettwurst sausage made by certain packers; this was the first reported instance of NPy in sausage. Through a series of appropriately designed experiments, they found that only sausages prepared with the packers' curing mixture contained NPy; sausages prepared without their curing mixture were negative for this compound. Their curing mixture was heavily contaminated with NPy and another nitrosamine, nitrosopiperidine (NPi).

The curing mixture was a dry powder of spices (black pepper, paprika, and two others), salt, sodium nitrite, and sodium nitrate. Further tests showed that both the black pepper and paprika could react with nitrite to form NPy and NPi. Black pepper predominantly formed NPi, and paprika formed mainly NPy. No nitrosamines were found when the mixtures were analyzed immediately after combining the spices.

3.12 THE HYDROLYSIS OF SODIUM TRIPHOSPHATE IN COD AND BEEF MUSCLE
(3.2345)

Sutton, A. H. (Unilever Research Laboratory, Greyhope Rd., Aberdeen, Scotland)
Journal of Food Technology 8, No. 2, 185-195 (June 1973)

Polyphosphates may be used in meat and fish to reduce liquor losses during processing. Generally, sodium triphosphate (TP) and pyrophosphate (PP) are more effective than the orthophosphate (OP). Earlier published work seems to indicate that TP and higher molecular weight phosphates are hydrolyzed in the presence of beef and pork muscle. The purpose of the present study was to quantify the effect of sodium triphosphate in beef and cod muscle; P^{32} labeled TP was used to follow the fate of the molecule in the muscles. The muscle samples were dipped for 1 h at 0° C in phosphate solutions containing approximately 0.1M TP (actually, the distribution in the solution was about 80% TP and 20% PP). The dipped samples were drained, sealed in polythene bags, and stored at 0° C or 25° C. The muscle samples were analyzed for TP, PP, and OP at intervals of 0, 3, 6, 12, 24, and 72 h.

Rapid hydrolysis of triphosphate occurs in cod and beef muscle and the rate is approximately proportional to the total protein content. Furthermore, in the cod muscle, the pyrophosphate hydrolyzes equally rapidly, and, at 0° C, only the orthophosphate remains after 30-40 h. The pyrophosphate is more stable than the triphosphate in beef muscle at 0° C, but at 25° C the pyrophosphate disappears within 24 h. Apparently, the reaction of triphosphate and pyrophosphate with muscle to give increased water retention is an irreversible one.
[4 figures, 2 tables, 7 references, 2 appendixes] FTP

3.11 PRESERVING MIXTURE POLITSIKLIN USED TO PRESERVE FRESH FISH IN COOLED SEA WATER

Skvortsova, G. G., E. S. Domnina, G. N. Kurov, Yu. A. Mansurov, N. P. Glazkova, V. F. Sopochkin, and G. S. Lysenkova (Irkutsk Institute of Organic Chemistry) (pat.)
U.S.S.R. 379,254 (Apr. 20, 1973)
Chemical Abstracts 79, No. 13, 77202f (Oct. 1, 1973)

3.11 COMPOSITIONS CONTAINING FATTY ACIDS AND SORBIC ACID FOR FOOD PRESERVATION

Ueno, Ryuzo, Shigeo Inamine, Toshio Matsuda, and Tatsuo Kaneyama (Ueno Pharmaceutical Applied Research Laboratory) (pat.)
Japan. Kokai 73 28,628 (Apr. 16, 1973)
Chemical Abstracts 79, No. 4, 64838t (Sept. 17, 1973)

3.12 [APPLICATION OF ANTIBIOTICS IN THE FOOD INDUSTRY]

Tomas, B. (Intendantski Inst. JNA, Beograd, Yugoslavia)
Tehnologija Mesa 13, No. 11, 306-313 (1972) (In Serbo-Croat)
Food Science and Technology Abstracts 5, No. 8, 266, Abstract No. 8T425 (Aug. 1973)

Antibiotics are used for preservation of poultry, meat, and fish. Methods of applying the antibiotics include spraying on food, soaking the food in an antibiotic solution, incorporation into minced meat, and wrapping material made of an antibiotic treated cellophane. Fresh milk is not preserved with antibiotics. The use of antibiotics as an auxiliary step in canning operations improves the quality of the food because sterilization temperature and time can be reduced. SW

3.12 (1.85) USE OF ANTIBIOTICS IN THE PRESERVATION OF PRAWN

Surendran, P. K., and Mahadeva K. Iyer (Cent. Inst. Fish. Technol., Ernakulam, India)
Chemical Abstracts 79, No. 5, 30568q (Aug. 6, 1973)

3.15 EXTENSION OF SHELF-LIFE OF INDIAN MACKEREL (RASTRELLIGER KANAGURTA) BY IRRADIATION

Venugopal, V., K. A. Savagaon, U. S. Kumta, and A. Sreenivasan (Biochemistry and Food Technology Division, Bhabha Atomic Research Centre, Trombay, Bombay 85, India)
Journal of the Fisheries Research Board of Canada 30, No. 2, 305-309 (Feb. 1973)

An optimum dose of 150 krad extended the chilled (0°-2° C) shelf-life of fresh dressed Indian mackerel to 25-30 days; under the same conditions, the shelf-life of unirradiated fish was 10-12 days. When the irradiated mackerel were vacuum packed in cellophane film, the fish tended to exude muscle fluids during storage. Fish stored in ice more than 5 days before the irradiation treatment showed reduced chilled storage life after irradiation.
[4 figures, 2 tables, 19 references] FTP

2.9

Probably the piperidine, pyrrolidine, or their precursors in these spices can react with nitrite to form NPy and NPi.

NPy and NPi are carcinogenic to laboratory animals, but there is yet no direct evidence of their carcinogenic effect in man. Nevertheless, the authors suggest that the practice of premixing certain species with nitrite in meat curing mixtures may be hazardous due to the formation of nitrosamines.
[3 tables, 11 references] FTP

3.12 (3.2345) POLYPHOSPHATES AND FISH: SOME CHEMICAL STUDIES

Gibson, D. M., and C. K. Murray (Torry Research Station, 135 Abbey Road, Aberdeen, Scotland)
Journal of Food Technology 8, No. 2, 197-204 (June 1973)

Polyphosphates are used for treating fish to minimize drip in the frozen fishery products and to reduce loss of weight on cooking. Sodium tripolyphosphate and sodium pyrophosphate appears to be the most useful of the condensed phosphates for the purpose. The purpose of this study was to determine how much polyphosphate was taken up by treated fish and to determine the suitability of some commercial polyphosphate mixtures. Seven species of fish were tested (cod, haddock, plaice, lemon sole, redfish, hake, and saithe). Six proprietary mixtures of polyphosphates were examined. The fish were filleted and portions of the fillets were dipped into the polyphosphate solution (5% sodium tripolyphosphate plus 5% sodium hexametaphosphate). The dipped portions were drained, packed into polypropylene/polyethylene pouches, and then stored at 1°-3° C. Phosphorus assays were made on both the treated and untreated fish muscle. The proprietary mixtures were analyzed by thin-layer chromatography.

The researchers found that the fish-to-fish variation in natural phosphorus content was so large that it was not possible (by the methods used) to determine whether or not the fish had been treated with polyphosphate. The amount of polyphosphate taken up under the conditions of the test was equivalent to 50-100 mg P per 100 g of fish muscle.

Several of the commercial mixtures of polyphosphates showed a high proportion of sodium tripolyphosphate and sodium pyrophosphate.
[2 figures, 3 tables, 16 references] FTP

3.234 ORGANOLEPTIC ASSESSMENT OF PRODUCTS FROZEN BY TWO METHODS: LIQUID NITROGEN AND BLAST FREEZING

Hill, Margaret A., and G. Glew (Catering Research Unit, Procter Dept. of Food and Leather Science, Leeds University, Leeds LS2 9JT, England)
Journal of Food Technology 8, No. 2, 205-210 (June 1973)

Macaroni cheese, poached codfish, carrots, and coq au vin (chicken legs in a sauce) were prepared, and then samples of each, packaged in polyethylene freezing molds, were frozen in liquid nitrogen (-10° C) or in a blast freezer (-25° C). The frozen food was sealed in a polyethylene bag and stored at -18° to 22° C for 3-18 days or more than 6 weeks. The products were reheated and rated organoleptically by a panel of judges.

The food products frozen by the two methods were not significantly different, with the exception of macaroni cheese. After 6 weeks of storage, the macaroni cheese product frozen by liquid nitrogen showed significantly higher scores for flavor and texture than did the product frozen in a blast freezer. For the products tested, liquid nitrogen freezing of multiportion packs of cooked food products offers no appreciable advantage over freezing them in an efficient blast freezer, at least when the frozen product is stored only a short time.

[2 tables, 2 references] FTP

3.237 IMPROVING THE SUPPLY OF MINCED BLOCKS FOR THE FISH STICK TRADE: A PROGRESS REPORT

King, Frederick J. (National Marine Fisheries Service, NOAA, Atlantic Fishery Products Technology Center, Emerson Ave., Gloucester, MA 01930)
Marine Fisheries Review 35, No. 8, 26-32 (Aug. 1973)

This paper, in the form of a progress report, describes the author's work on the development of frozen minced fish blocks from the meat obtained from "fish frames." The term fish frame refers to the backbone of a fish after the fillets have been removed. The backbone portion contains some adhering muscle, and it is this muscle meat that is separated from the backbone and used in the preparation of frozen minced fish blocks. The meat is separated from the bone by a mechanical meat-bone separator, which essentially minces the muscle tissue.

But, fish frames contain blood-rich tissue just under the backbone. This pigmented tissue gives the separated minced meat a reddish color, which is considered undesirable. The author describes various methods that help improve the color and appearance of the minced fish blocks. The last part of the report is a discussion of the quality evaluation of prepared frozen minced fish blocks. It also contains a copy of an inspection report form for evaluating minced fish blocks

[5 illustrations, 8 references] FTP

3.2495 EFFECT OF SEASON ON SALT-EXTRACTABLE PROTEIN IN MUSCLE FROM TRAWLER-CAUGHT COD AND ON ITS STABILITY DURING FROZEN STORAGE

Castell, C. H., and Doris M. Bishop (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 157-160 (Feb. 1973)

Two hundred and seventy-two fillets from fresh cod that were caught during 10 months of a year were analyzed for the salt extractable protein and for lipid content of the muscle. Fillets from the same lots of fish were frozen and placed in storage at -3.3°, -12°, and -26° C. At periodic intervals, salt extractable protein determinations were made on the stored cod fillets. The salt extractable protein of the fresh cod fillet was slightly lower in those fish caught during the spring spawning period (March, April, and May); there was also a slight decrease in the lipid content of the muscle. The fillets of cod caught during the spring spawning period and stored at -3.3° and -12° C, deteriorated faster (as indicated by salt extractable protein values) than similar fillets of fish caught during the summer and fall and stored at the same temperatures. When the fillets were stored at -26° C for up to 2 years, the changes in the salt extractable protein values of the muscle were so minor that seasonal difference in storage quality could not be detected.

[3 figures, 16 references] FTP

3.4 (1.92) A PROCEDURE FOR PROCESSING SMOKED CHANNEL CATFISH (ICTALURUS PUNCTATUS)

Boggess, T. S., Jr., E. K. Heaton, and L. R. Beuchat (Dept. of Food Science, University of Georgia Agricultural Experiment Station, Experiment, GA 30212)
Journal of Milk and Food Technology 36, No. 9, 469-473 (Sept. 1973)

Various procedures for smoking channel catfish were investigated. The effects on the quality of the product were evaluated after the following conditions in the procedures were varied: storage time before brining, fish size, brining time and formula, smoking time and temperature, and storage time after smoking. The most acceptable product was prepared by the following procedure. Catfish averaging 10.5 oz (dressed) were brined for 24 h at 40° F; the brined fish were subjected to smoking in which the internal flesh temperature was gradually increased from 90° to 140° F over a 22-h period, followed by an increase to 180° F over a 4-h period, and then held at this temperature for 30 min. Organoleptic evaluation of the finished product indicated that catfish smoked in this manner were as acceptable as smoked haddock and chubs. In the acceptable procedure, the use of a freshly dressed catfish produced a smoked product that was similar in quality to one prepared from frozen catfish. The acceptable brining mixture consisted of 72 lb of water containing 9 lb sugar, 9 lb sodium chloride, 0.23 oz potassium nitrate, and 0.23 oz sodium nitrate. The smoking step consisted of generating smoke from moist hickory wood chips in a thermostatically controlled smokehouse. The temperature of the chamber was gradually increased to produce the internal flesh temperatures that were optimal in preparing acceptable smoked catfish. According

3.235 [FISH PRODUCT]
(3.4)

Unilever NV (pat.)
Netherlands Patent Application 7,206,554 (1972) (In Dutch)
Food Science and Technology Abstracts 5, No. 6, 152, Abstract No. 6R262 (June 1973)

Raw fillets of coal fish, trout, or salmon are treated with salt to give a salt content of 3-10%. The salted fillets are then coated with a mixture of commercial fish flesh, salt, and edible inorganic phosphate. The fillets are then formed and frozen in blocks. Portions cut from the blocks are then smoked in the frozen state. FTP

3.4 (1.92)

to P. J. Pace and E. R. Krumbiegel ["Clostridium botulinum and Smoked Fish Production: 1963-1972," J. Milk Food Technol. 36, 42-49 (1973)], fish must be removed from the smoking chamber to a separate room for prompt cooling. After cooling, the fish must be packaged within 2 h after completion of smoking; the packages must bear the words "Perishable-Keep Refrigerated"; the package must not be sealed to allow exchange of air; the package must bear the processing date and expiration date; the smoked fish must be maintained at a refrigeration temperature of no more than 40° F (4.5° C) from the time of packaging, during transportation, and during display; and the expiration date must be 7 days following the date of smoking. If these rules are followed the safety and organoleptic properties of smoked catfish will be preserved.
[3 tables, 11 references] SW

3.4 PHENOL AND FORMALDEHYDE CONTENTS IN SMOKED FOODS
(8.59)
Cantoni, C., I. Dragoni, and V. L'Acqua (Ist. Ispezione Alimenti. Origine Anim., Univ. Milano, Milan, Italy)
Chemical Abstracts 79, No. 4, 64702u (Sept. 17, 1973)

3.27 [THAWING OF DEEP-FROZEN FOODS IN VACUO]
DAS AUFTAUEN TIEFGEFRORENER NAHRUNGSMITTEL IM VAKUUM

Everington, D. W. (APV Clarke-Built Ltd., Stephenson Way, Thetford, Norfolk, United Kingdom), and A. Copper
Allgemeine Fischwirtschaftszeitung 25, No. 5, 21-23 (1973) (In German)
Food Science and Technology Abstracts 5, No. 6, 151, Abstract No. 6R260 (June 1973)

The system for vacuum thawing frozen foods developed jointly by the Torry Research Station, Aberdeen, Scotland, and a commercial firm is described. The system is based on the transfer in a vacuum of the latent heat of vaporization of the fishery product. FTP

3.5 [THEORY OF FISH MEAT RIPENING DURING SALTED FISH DRYING]

Bal', V. V. (Astakhanskii Tekh. Inst. Rybnoi Promyshlennosti i Khozyaistva, U.S.S.R.), and L. I. Khvalova
Izvestiya Vysshikh Uchebnyck Zavedenii, Pishchevaya Tekhnologiya No. 1, 74-76 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 157, Abstract No. 6R288 (June 1973)

Caspian bream were used in this dry salt fish study. Curing of the dry salt bream involved three distinct but interlinked stages: (1) There was an increase in the tension of the surface of the muscle tissue due to the lowered water content; (2) a water-fat emulsion formed throughout the muscle tissue; and (3) aminolipid compounds having special aromatic and flavor properties formed in the tissue. FTP

3.3 RELATION BETWEEN THE QUALITY OF CANNED FISH AND ITS
(8.8) CONTENT OF ATP-BREAKDOWN. III. ATP-BREAKDOWNS IN CANNED ALBACORE AND SKIPJACK IN RELATION TO THE ORGANOLEPTIC INSPECTION
Fujii, Yutaka, Katsuo Shudo, Kuniyuke Nakamura, Senji Ishikawa, and Minoru Okada (Tokai Reg. Fish. Res. Lab., Tokyo, Japan)
Chemical Abstracts 78, No. 13, 83014s (Apr. 2, 1973)

3.3 EFFECT OF THE TIME OF STORAGE ON THE ACIDITY OF FAT IN
(8.53) SOME CANNED FISH
Wierzchowski, J., B. Wituszynska, and R. Gajewska (Dep. Bromatol., Med. Acad. Gdansk, Gdansk, Poland)
Chemical Abstracts 79, No. 7, 41061v (Aug. 20, 1973)

3.9 (0.6) FISH EXTENDER STRETCHES FROZEN SEAFOOD PROFITS

Anonymous
Quick Frozen Foods 36, No. 3, 29 (Oct. 1973)

"SEAPRO" is the trade name of a new soy protein-based extender for seafood items. SEAPRO can be used to replace a portion of the fish in a seafood preparation without modifying its taste, texture, and general appearance. The product is available in 10-lb loaves 36 in long and 4 in in diameter. It can be stored indefinitely in a frozen state. Shelf life is 1 month under refrigeration and 1 week at room temperature. SEAPRO is white in color, and it has a bland flavor. It can withstand repeated freezing and thawing with no loss in quality. The product can be ground, cubed, chopped, or flaked to resemble various types of fish and crab meat. It has the following typical analysis: protein, 18.7%; fat, 16.7%; ash, 2.6%; and moisture, 61.7%. SEAPRO can be fortified by its manufacturer with vitamins and minerals to conform to U.S. Dept. of Agriculture Food and and Nutrition Service Notice 219 requirements for school lunch programs.
[2 photographs] SW

4.13 DISTRIBUTION OF TRANS-6-HEXADECENOIC ACID, 7-METHYL-7-HEXADECENOIC ACID AND COMMON FATTY ACIDS IN LIPIDS OF THE OCEAN SUNFISH MOLA MOLA

Hooper, S. N., M. Paradis, and R. G. Ackman (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Lipids 8, No. 9, 509-516 (Sept. 1973)

Results of this study of the fatty acids in the lipids of ocean sunfish suggest that the sunfish obtains a major part of its sustenance from jellyfish and similar pelagic invertebrates. Two unusual fatty acids trans-6-hexadecenoic acid and 7-methyl-7-hexadecenoic acid, were found in the sunfish lipid, and they are considered to be of exogenous origin.
[3 tables, 27 references] FTP

4.13 (3.249) CHANGES IN THE COMPOSITION OF FATTY ACIDS IN SOME FISH DURING STORAGE

Salmonowicz, J., and J. Zalewski (Sea Fish. Inst., Gdynia, Poland)
Chemical Abstracts 79, No. 7, 41060u (Aug. 20, 1973)

4.11 DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: I. ANALYSIS WITH USE OF THERMAL CONDUCTIVITY DETECTOR

Watanabe, S., S. Hayano, T. Akiya, K. Mimura, S. Nakasato, H. Seino, and Y. Usui (Japan Oil Chemists' Society Gas Chromatography Committee, Yushikogyokaikan 7F 3-13-11, Nihonbashi, Chuo-ku, Tokyo 103, Japan)
Journal of the American Oil Chemists' Society 50, No. 9, 357-359 (Sept. 1973)

In order to establish a standard method for the gas chromatographic determination of fatty acids, a study team consisting of representatives from industrial, independent, government, and university laboratories carried out replicate analyses of specified samples. Gas chromatographs with thermal conductivity detector were used. Four standard samples consisting of mixtures of methyl laurate, methyl myristate, methyl palmitate, and methyl stearate were prepared and used in the collaborative tests. Results of four tests showed that interlaboratory scattering of data and deviation of analytical values from actual composition could be decreased by (1) enlarging the size of narrow peaks (less than 5 mm at half height) or peaks of low height by adjusting the attenuator range or chart speed and (2) adjusting the analytical values by use of correction factors determined from the analysis of known mixtures having compositions similar to those of the unknown sample.
[3 tables, 4 references] FTP

4.5 REACTION OF AUTOXIDIZING LINOLEATE WITH COHO SALMON MYOSIN

Braddock, R. J., and L. R. Dugan, Jr. (Dept. of Food Science, Michigan State University, East Lansing, MI 48823)
Journal of the American Oil Chemists' Society 50, No. 9, 343-347 (Sept. 1973)

Earlier work has shown that the decomposition products of oxidized lipid in freeze-dried salmon probably reacted with the amino groups of the protein to produce browning. One reactive constituent produced from polyunsaturated fatty acid (PUFA) oxidation is malonaldehyde; it can participate in reactions involving free-amino groups of proteins and amino acids. Coho salmon contain significant proportions of oleic, linoleic, linolenic, and arachidonic acids; these acids produce malonaldehyde or malonaldehydelike products under oxidative conditions. However, carbonyl compounds other than malonaldehyde may possibly participate in protein-lipid oxidation product interactions. Malonaldehydelike products, in the presence of water, may exist as nonvolatile enolate ions and thus they can react with amino acids, proteins, glycogen, and other food constituents to produce a bound complex that is hydrolyzable by acid or heat. Browning of some food systems containing oxidizable lipids and proteins may also involve complex lipid-protein interactions and reactions involving other constituents. The present study gave new evidence that production of C=N compounds occurs as a result of reactions between autoxidation products of the PUFA and amino groups present in a biological system.

Model systems containing buffered solutions of sodium linoleate, coho salmon myosin, and sodium linoleate-myosin were permitted to oxidize at 50° C under an oxygen atmosphere. Fluorescent components, showing characteristic spectra, were extracted and isolated by thin-layer chromatography from the autoxidizing model

4.11 DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: II. ANALYSIS WITH USE OF FLAME IONIZATION DETECTOR

Watanabe, S., S. Nakasato, S. Hayano, H. Kuwamura, T. Nagai, M. Negishi, Y. Sasamoto, H. Seino, and S. Shiraishi
Journal of the American Oil Chemists' Society 50, No. 9, 360-363 (Sept. 1973)

In this collaborative study, mixtures of four or five fatty acid methyl esters (methyl laurate, methyl myristate, methyl palmitate, methyl stearate, and methyl elaidate) were analyzed by gas chromatography using flame ionization detectors. By applying correction factors (obtained by using mixtures of known concentrations) the data on the test samples showed less interlaboratory scattering and less deviation from the actual values. When a constant amount of sample was injected, intralaboratory scattering of data decreased, but interlaboratory scattering of data did not decrease. The authors recommend that 0.5-1.0 µl of a 20% solution of sample be injected.
[4 tables, 6 references] FTP

4.2 CHANGE IN LIPIDS IN MARBLED NOTOTHENIA DURING THE PRODUCTION OF CURED FISH FILLETS

Lapshin, I. I., and M. G. Shevchenko (Mosk. Inst. Nar. Khoz. im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 79, No. 13, 77128m (Oct. 1, 1973)

4.5

systems and from freeze-dried salmon steaks and salmon kept frozen at -20° C for 1 year. At the beginning, TBA values and oxygen uptake of the autoxidizing systems showed rapid increases with time followed by a significant decrease in TBA values and slow leveling off of oxygen uptake on prolonged oxidation. Further analyses showed the presence of C=N functional groups in extracts from various samples. The control myosin solution allowed to oxidize without the addition of linoleate did not show these compounds. The myosin from the autoxidizing system showed significant decreases in the amounts of histidine, lysine, and methionine following oxidation as compared with the nonoxidized myosin-linoleate systems. Such reactions, the authors indicate, apparently contribute to the denaturation and destruction of the lipids and protein in the model system, and in the frozen or freeze-dried salmon product.
[5 figures, 1 table, 18 references] FTP

4.86 FATTY SUBSTANCE OF HIDE AND LEATHER. 11. COMPARISON OF PREPARING CONDITIONS OF SULFITED OIL AND ITS PROPERTIES

Shirai, Kunio, and Hiroshi Okamura (Yamazaki Chem. Lab., Saitama, Japan)
Chemical Abstracts 78, No. 8, 45088m (Feb. 26, 1973)

3.9 POSSIBLE SUBSTITUTES FOR NITRITE FOR PIGMENT FORMATION IN CURED MEAT PRODUCTS

Howard, Arlene, Patricia Duffy, Kathy Else, and W. Duane Brown (Institute of Marine Resources, Dept. of Food Science and Technology, University of California, Davis, CA 95616)
Journal of Agricultural and Food Chemistry 21, No. 5, 894-898 (Sept.-Oct. 1973)

Meat curing mixtures generally include salt, sugar, nitrate and/or nitrite, and often a reductant such as sodium ascorbate or sodium erythorbate. During the curing process nitrate and nitrite are reduced to nitric oxide, and the nitric oxide then binds with the heme pigments myoglobin and hemoglobin to form unstable bright red pigments, nitric oxide myoglobin and nitric oxide hemoglobin. A relatively stable pigment, denatured globin nitric oxide ferrohemochrome, is formed on heating. The use of nitrite in foods is currently being questioned, and proposals have been made to reduce the allowable sodium nitrite levels in finished food products from 200 to 10 or 20 p/m. The purpose of the present study was to examine various nitrogenous ligands for their ability to form pink pigments in models and cured meat systems.

Twenty-four nitrogenous ligands, at various concentrations, were tested for their ability to form ferrohemochromes with bovine myoglobin at pH 5.0 or 6.0. Methyl and hexyl nicotinate and N,N-diethylnicotinamide were particularly effective in this respect; they formed stable pink pigments in cooked ground meat mixtures. These three compounds and trigonelline in combination with 10 or 20 p/m of nitrite formed stable and long-lasting pink cured meat color in such systems.
[4 figures, 3 tables, 18 references] FTP

4.8 OILS AND FATS. IMPORTANT RAW MATERIAL SOURCE OF THE CHEMICAL INDUSTRY

Ploog, Uwe, and Guenter Reese (Henkel und Cie G.m.b.H., Dusseldorf, Germany)
Chemical Abstracts 79, No. 6, 32889u (Aug. 13, 1973)

4.83 ALKYD PAINT FOR TEXTURED COATINGS

Kitzler, Jaroslav, Karel Hajek, and Jiri Stanek (pat.)
Czech. 144,591 (July 15, 1972)
Chemical Abstracts 78, No. 2, 5512p (Jan. 15, 1973)

4.86
(6.86) EFFECT OF THE NATURE OF NUTRIENTS AND OTHER FACTORS ON PROPERTIES OF SEMIFINISHED COW HIDE. III. CHLOROSULFONATED OILS

Angelinetti, A. R., N. A. Lacour, and F. A. Luchese (La Plata, Argentina)
Chemical Abstracts 78, No. 26, 160928x (July 2, 1973)

6.134 DEHYDRATION EQUIPMENT
(6.34)(3.61)
(0.6)

McDonald, D. P.
Food Manufacture 48, No. 8, 37, 39, 41, 45, 54 (Aug. 1973)

In the economics of food preparation, continuous processing is an important requirement. In operations which cannot be continuous such as batch processing, modifications are adopted so that peripheral processing operations can be made continuous. The drying operation has been improved, and a variety of methods are available which can be integrated into continuous processing. This report is a survey of the drying equipment now available.

The conveyor dryer is the old style tray dryer made continuous. It can easily be cleaned, a necessity in the food industry. Variations of this equipment can be used either for flaked, granular, extruded, pelletized, and briqueted material, or for wet, pastelike material, or for continuously drying, toasting, and cooling bread crumbs and other dried bread products. The rotary dryer in its simplest form consists of a rotating cylinder fitted with internal projections which lift the material to be dried into a stream of hot gas. These dryers are used in the production of fish meal, semolina, sugar, alginates, chocolate crumb, and other meals and pulps. In the ring dryer, the material to be dried passes through a large ring-shaped duct while hot air passes through it. The advantages of this dryer are better control of final moisture content, and the capability of recycling the material through the ring if it is not uniformly dry. In spray drying, solutions

5.7 MODE OF ACTION OF SELENIUM AND VITAMIN E IN PREVENTION OF EXUDATIVE DIATHESIS IN CHICKS
(8.42)
(5.123)(0.7)

Noguchi, Tadashi, Austin H. Cantor, and Milton L. Scott (Dept. of Poultry Science and Graduate School of Nutrition, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 103, No. 10, 1502-1511 (Oct. 1973)

Exudative diathesis (ED) in chicks is a severe edema characterized by accumulation of subcutaneous fluid. Other workers have demonstrated that the disease is completely prevented by either vitamin E or selenium. J. T. Rotruck, A. L. Pope, H. E. Ganther, and W. G. Hoekstra [J. Nutr. 102, 689 (1973)] reported that selenium participates in the activity of the glutathione peroxidase (GSHpx) of rat erythrocytes; in addition, Se is part of the GSHpx molecule. Using this information, the authors investigated the GSHpx levels of chick plasma, erythrocytes, and liver in the presence or absence of dietary Se. The effects of vitamin E were also studied in the liver mitochondrial and microsomal membranes of chicks in relation to Se.

A crystalline amino-acid diet that was very low in Se and vitamin E was fed chicks. GSHpx activities were determined on the liver, plasma, and erythrocytes of the chicks after 6, 8, and 11 days on the diet. The results show that the GSHpx level of chick plasma is directly related to the Se level in the diet and to the effectiveness of Se in the prevention of ED. Experiments on the mode of action of vitamin E were performed. The results show that vitamin E is incorporated into the hepatic mitochondrial and microsomal membranes of chicks. Both

6.15 INCISOR FLUOROSIS IN MICE FED FISH-PROTEIN CONCENTRATE
(0.7)

Kerley, Michael A. (Dep. Biol. Texas A and M Univ., College Station, Tex.)
Chemical Abstracts 79, No. 4, 64991n (Sept. 17, 1973)

5.7 (8.42)(5.123)(0.7)

vitamin E and Se were found to be necessary to protect these membranes from ascorbic acid-induced lipid peroxidation in vitro.

The results obtained from these experiments permitted the development of the hypothesis that the plasma GSHpx present when the diet contains Se prevents the peroxidation of the unsaturated lipids of the cellular membranes. When the diet is deficient in Se, vitamin E in the diet prevents a chain-reactive autoxidation of the membrane lipids. These modes of action protect the chick against ED. The authors conclude that vitamin E appears to neutralize the free radicals which would attack the membrane lipids to form lipid peroxides. Selenium, through GSHpx, acts by destroying any peroxides that are formed.
[12 figures, 1 table, 20 references] SW

6.13 AZEOTROPIC REMOVAL OF WATER-HYDROCARBON ALCOHOL MIXTURES FROM FISH PRESS CAKE

Meade, Thomas L. (pat.)
U.S. Patent 3,712,822 (Jan. 23, 1973)
Chemical Abstracts 78, No. 21, 134735n (May 28, 1973)

6.190 MILK SUBSTITUTE

Bouffault, Jean C. R. (Legoy, Maurice) (pat.)
Ger. Offen. 2,246,245
Chemical Abstracts 79, No. 3, 17227h (July 23, 1973)

6.197 UTILIZATION OF SOFT PHOSPHATE IN DIETS WITH AND WITHOUT FISH MEAL OR SUPPLEMENTAL CALCIUM PHOSPHATE

Christmas, R. B., B. L. Damron, and R. H. Harms (Exp. Stn., Gainesville, Fla.)
Chemical Abstracts 79, No. 9, 52062x (Sept. 3, 1973)

4.91 FATTY ACID COMPOSITION OF NEPHTYS INCISA AND YOLDIA LIMATULA

Farrington, John W., and James G. Quinn (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881), and Wayne R. Davis
Journal of the Fisheries Research Board of Canada 30, No. 2, 181-185 (Feb. 1973)

The fatty acid composition of marine organisms may be influenced by the environment and by the fatty acid composition of their diet. Thus, attempts to give average fatty acid composition of depot fats of marine organisms may be unrealistic. In this study, the researchers determined the fatty acid composition of an infaunal worm, Nephtys incisa, and the bivalve, Yoldia limatula, collected in Narragansett Bay, Rhode Island. Y. limatula contained 9% to 16% (based on total fatty acids) of an acid identified, tentatively as 22:2. The ratios of 18:1/18:0 and 18:1/20:1 fatty acids of the N. incisa from a polluted area in the bay were lower than the ratios of the corresponding acids from the organisms taken in relatively clean areas.
[1 figure, 4 tables, 10 references] FTP

4.9 (2.8) NUTRITIONAL-PHYSIOLOGICAL PROPERTIES OF FISH-FRYING OILS. 3. GEL PERMEATION CHROMATOGRAPHY OF FISH-FRYING OILS

Unbehend, M., and H. Scharmann. (Germany)
Chemical Abstracts 79, No. 4, 64754n (Sept. 17, 1973)

6.134 (6.34)(3.61)(0.6)

and slurries which can be reduced to a fine spray are subjected to flash evaporation. The material is atomized in a conical case, and hot air flowing through the material carries off the moisture. The dried material is collected outside of the drying chamber. This drying process is used in the production of dried coffee, whey, and fish protein concentrate. Fluid bed dryers are used for crystalline materials such as salt and dextrose and those materials which release water slowly. The screw conveyor/dryer is used where a material requires drying or cooling while it is conveyed to the next processing operation. The batch dryer is still used for such products as almonds, caramel, desiccated coconut, and other granular materials. It may still be in use in the preparation of fish meal. Drum dryers and pneumatic dryers were also described.
[10 figures] SW

6.133 SEPARATING FAT FROM ANIMAL MATERIAL

Hoffmann, W. (Alfa-Laval AB) (pat.)
Sweden 351,433 [Patent No. ?] (Nov. 27, 1972)
Chemical Abstracts 78, No. 26, 161166j (July 2, 1973)

6.195 A COLLABORATIVE STUDY ON THE DETERMINATION OF AVAILABLE LYSINE IN FEEDING STUFFS

Milner, C. K., and D. R. Westgarth (Shell Research Limited, Tunstall Laboratory, Broad Oak Road, Sittingbourne, Kent, England; and National Institute for Research in Dairying, Shinfield, Reading RG9 2AT, England)
Journal of the Science of Food and Agriculture 24, No. 8, 873-882 (Aug. 1973)

The available lysine value is used as an index of protein quality. Several methods for determining available lysine have been proposed, with the methods of K. J. Carpenter [Biochem. J. 77, 604 (1960)] and A. G. Roach, P. Sanderson, and D. R. Williams [J. Sci. Fed. Agric. 18, 274 (1967)] (the Silcock method) being used most frequently. In this study, the method of Carpenter and the Silcock method were compared in two collaborative trials involving eight laboratories. Fish meal and groundnut meal were used in the first trial; and soybean meal, sunflower meal, a commercial mixed feed, and wheat meal were used in the second trial.

There was no statistically significant difference between the two methods in terms of their overall mean values; however, for the mixed feed, the values by Carpenter's method tended to be lower. The standard deviations for available lysine obtained interlaboratory were numerically greater by Carpenter's method with each feeding stuff, but significance was only established with confidence in the case of the wheat meal.

The authors conclude that there is little difference between the two methods, although the Silcock method may be more precise. Both methods require experience and good laboratory practice.

[2 tables, 11 references] FTP

6.34 BENTHIC MARINE AND BLUE-GREEN ALGAL SPECIES AS A SOURCE OF CHOLINE

DaSilva, Edgar, and Arne Jensen (Norwegian Institute of Seaweed Research, 7034 Trondheim-NTH, Norway)
Journal of the Science of Food and Agriculture 24, No. 7, 855-861 (July 1973)

This work is part of a study of the systematic evaluation of seaweed meal as a feed additive. Although choline, free or combined, occurs in most all plant and animal tissues, little information is available on the choline content of seaweeds. In this study, species of red, brown, and green seaweeds and blue-green algae were analyzed for choline content. About one-third of the seaweeds and all of the blue-green algae showed very low choline content values. Of the remainder, the brown seaweeds showed levels of from 0.1 to 6 mg, the red from 1 to 6 mg, and the green from 3 to 8 mg choline per gram of dry material. The seasonal variations in choline content of three brown algae were also examined. Over a 17-month period one species showed higher choline values in the winter and spring and relative lower values in the summer and fall; another species fluctuated irregularly over the entire period; and the third species showed irregular fluctuations during the first 6 months and then showed fairly stable values for the rest of the test period. Six commercially produced seaweed meals prepared from Ascophyllum nodosum (brown algae) showed from 2.5 to 3.1 mg of choline per gram of meal (dry weight).

[1 figure, 4 tables, 13 references] FTP

6.31 (1.0114) KELP HABITAT IMPROVEMENT PROJECT COVERING THE PERIOD JULY 1, 1971 TO JUNE 30, 1972

North, Wheeler J.
Published by W. M. Keck Laboratory of Environmental Health Engineering, California Institute of Technology, Pasadena, Calif. (1973), ix + 200 pp.

Kelp is an important marine resource of California. Members of State government agencies, industrial organizations, recreational groups, and academic institutions have been concerned with the condition of the kelp beds. Persistent deterioration began about 1940 among kelp beds in southern California. Influences such as high temperatures contributed to the declining kelp beds. Studies undertaken between 1956 and 1962 indicated, in part, that vast numbers of sea urchins were grazing on the remains of several important kelp beds and destroying them. The absence of the sea otter, an important sea urchin predator, exacerbated the situation. Starting in 1962, studies were performed to determine whether sea urchin populations could be controlled. By applying information gained, a significant portion of the depleted kelp bed off Point Loma was restored by sea urchin control. Project personnel undertook kelp restoration at other locations on the coast of California.

This report is divided into nine chapters most of which describe restoration projects at various places on the coast. The remaining chapters cover urchin control, kelp culture, and the biology of the major kelp genus, Macrocystis.

[57 illustrations, 18 tables, 14 references] SW

6.51 AN INITIAL EVALUATION OF ETHYLENE OXIDE FOR THE STERILIZATION OF FORMULATED AND PELLETED FISH FEEDS

Trust, T. J., and A. J. Wood (Dept. of Bacteriology and Biochemistry, University of Victoria, Victoria, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 269-274 (Feb. 1973)

Earlier work has indicated that commercial fish feeds contain a mixed microflora including bacterial species potentially harmful to man and fish. The nature and extent of the microflora are determined, in part, by the ingredients used in the feed. A reduction in the microflora of fish feeds would help lower the probability of feed-borne infection and help in the maintenance of sanitary conditions in hatcheries and rearing ponds. In this study, the effects of ethylene oxide treatment of pelleted dry feeds on their bacterial burden were determined, and the growth of juvenile rainbow trout fed the ethylene oxide treated feeds was evaluated.

Three different fish feeds and four commercial feedstuffs (bran, turkey grower pellets, duck grower pellets, and chick starter pellets) were tested. The pelleted feedstuffs were treated with ethylene oxide-carbon dioxide gas mixture (20:80). The original and treated feedstuffs were submitted to bacterial examination and to bioassay with rainbow trout.

There was a substantial reduction in the number of the various viable bacteria in the feeds after exposure to ethylene oxide for 1-3 h. Exposure of 6 to 12 h was sufficient to sterilize feedstuffs having an initial bacterial count of 10^3-10^5 cells.

6.31 MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. HIGHER PLANTS OF THE MARINE FRINGE

Moul, Edwin T. (Dept. of Botany, Nelson Biological Laboratories, Rutgers University, New Brunswick, NJ 08903; and Systematics-Ecology Program, Marine Biological Laboratory, Woods Hole, MA 02543)
NOAA Technical Report NMFS CIRC-384, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, U.S. Dept. of Commerce (Sept. 1973), 60 pp.

The common higher plants of the beaches, dunes, morainal cliffs, and tidal marshes of Southern New England are treated in an illustrated key, using only vegetative characters. Both scientific and common names are given. Habitat lists of the plants are included, presenting to the investigator the association of plants as they occur in nature. The range of each plant along the Atlantic coast is designated. A glossary of terms is included.
[109 figures, 11 references] Author's abstract

6.32 PECTIC SUBSTANCES OF SEA GRASSES. IX. DEGRADED ZOSTERIN

Mikheiskaya, L. V., R. G. Ovodova, and Yu. S. Ovodov (Inst. Bid. Akt. Veshchestv, Vladivostok, U.S.S.R.)
Chemical Abstracts 78, No. 21, 136566 (May 28, 1973)

6.51

The growth rates of juvenile rainbow trout fed the sterilized feed were comparable to or better than the growth rates of trout fed the same feed not sterilized. [7 tables, 16 references] FTP

6.85 FISH-GLUE

Egorova, L. N., V. I. Treshcheva, L. F. Markova, and Yu. V. Maslennikov (All-Union Scientific Research Institute of Ocean Fish Husbandry and Oceanography, U.S.S.R.)
Chemical Abstracts 79, No. 9, 43697f (Sept. 3, 1973)

6.195 CONTENT OF AVAILABLE (DINITROPHENYL) LYSINE IN FEEDS OF ANIMAL ORIGIN. IV. FISH MEAL

Stanchev, Khristo, Lidiya Angelova, Bero Marinov, Margarita Dzharova, and Anna Ikonomova (Inst. Zhivotnovud., Kostinbrod., Bulgaria)
Chemical Abstracts 78, No. 13, 83058j (Apr. 2, 1973)

6.23 PREPARATION AND COMPOSITION OF THE LIVER EXTRACT FROM FISH LIVER RESIDUE. BY-PRODUCT OF FISH LIVER OIL INDUSTRY

Haq, S. A., Salcha Masood, and Razia Rafiq (Pakistan Counc. Sci. Ind. Res. Lab., Karachi, Pakistan)
Chemical Abstracts 79, No. 2, 9809j (July 16, 1973)

6.37 HERE'S HELP FOR KELP LOVERS

Shaw, Eleanor
Seattle Post-Intelligencer (Supplement) Northwest Today, Seattle, Wash. (Sept. 30, 1973), p. 7

This article contains recipes for making pickled kelp, kelp grape conserve, and kelp mint marmalade. Other kelp recipes may be obtained from the Extension Service of the University of Alaska and from the book by Marjorie Furlong and Virginia Pill [Edible? Incredible!, Ellis Robinson Publishing Co., Everett, Wash. (1972), $2.50]. Only bulbs and stems that are picked from a living kelp bed should be used in the preparations. After draining for several hours, the bulbs are split and the stems are cut into 12-in lengths. The centers are cleaned with a bottle brush, and the dark surface layer is peeled with a vegetable parer. To make pickles, the kelp is soaked in brine, washed with cold water, and cubed or sliced. The cubes are soaked in alum solution, washed in cold water, and cooked in an enamel pot until tender. A pickling mixture of vinegar, sugar, and cinnamon and clove oils is boiled and poured over the cooked kelp. After standing overnight, the syrup is drained off, boiled, and poured back over the kelp. The mixture is allowed to stand overnight again. It is then heated to the boiling point, packed in jars, and sealed while hot. The preliminary steps for preparing pickles also apply to preparing kelp grape conserve or kelp mint marmalade. The kelp in these two preparations is ground in a food chopper, and cooked with the following ingredients: grape juice, lemon juice, and sugar (for kelp grape conserve) and vinegar, green coloring, mint, and sugar (for kelp mint marmalade). The thickened mixtures are poured into hot sterilized jelly glasses and sealed immediately with hot paraffin. SW

6.54 ACID PRECIPITATED FISH PROTEIN ISOLATE EXHIBITS GOOD FUNCTIONAL PROPERTIES

Rasekh, J., and A. Metz (National Marine Fisheries Service, NOAA, College Park, Md.
Food Product Development 1, No. 8, 18, 20, 22, 24 (Oct. 1973)

The usefulness of a protein isolate as a food supplement largely depends on the extent of its functional properties. These properties include solubility, dispersibility, wettability, emulsion capacity, nutritive quality, viscosity, and hedonic acceptability. The authors developed a method to produce a fish protein isolate with good functional properties. The amino-acid content of the isolate was similar to that of fish protein concentrate (FPC) prepared by the isopropyl alcohol extraction of whole fish.

The protein isolate was prepared from red hake (Urophycis chuss). Deboned fish was microcut by passing it through a plate with 3 mm holes. A sample was slurried with 0.12 N NaOH and heated with stirring to 65°-75° C within ½ h. After maintaining this temperature for 2 h, the slurry was passed through a 40-mesh screen and cooled to about 50° C. At this point, while maintaining the temperature, 30% hydrogen peroxide was added and the slurry was mixed for 30 min. The pH was then adjusted to precipitate the protein (the isoelectric point was at pH 4.5) with either 5 N phosphoric, hydrochloric, or lactic acid (in different trials). The protein was recovered by filtration or centrifugation and extracted three times with isopropyl alcohol. Each extraction was performed at 60°-65° C for 15 min. The extracted isolate was washed twice with hot water and then either freeze dried or spray dried.

6.72 (1.3) NUCLEOPROTEIN-CONTAINING SHAMPOOS AND SOAPS

General Mills, Inc. (pat.)
French [Patent] 2,135,817 (Jan. 26, 1973)
Chemical Abstracts 79, No. 16, 93741m (Oct. 22, 1973)

6.72 AGENT FOR CONTROLLING AQUEOUS FLUID LOSS INTO WELL FORMATIONS

Yuen, Mao H., and Wesley A. Jordan (General Mills Inc.) (pat.)
U.S. Patent 3,733,274 (May 15, 1973)
Chemical Abstracts 79, No. 16, 94423w (Oct. 22, 1973)

7.42 (9.19) RELATION BETWEEN TOTAL BODY WEIGHT AND CONCENTRATIONS OF MANGANESE, IRON, COPPER, ZINC, AND MERCURY IN WHITE MUSCLE OF BLUEFISH (POMATOMUS SALTATRIX) AND A BATHYL-DEMERSAL FISH ANTIMORA ROSTRATA

Cross, F. A., L. H. Hardy, N. Y. Jones (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516), and R. T. Barber
Journal of the Fisheries Research Board of Canada 30, No. 9, 1287-1291 (Sept. 1973)

Reports of other work indicated that concentrations of Mn, Fe, Cu, Cd, and Zn in whole fish either decrease or remain constant, with age (length and weight), but concentrations of Hg increase in the whole fish and in muscle tissue. Studies were performed to determine the relationship of total body weight and concentrations of trace metals in white muscle of two species of fish that inhabit different environments in the Atlantic Ocean. The fish used in the study were bluefish, found in coastal waters of the western Atlantic, and A. rostrata, a deep-sea morid fish taken from a depth of 2,500 m.

The results indicate that the concentrations of Hg in the muscle of the bluefish and A. rostrata increased with the body weight of the fish. In contrast, the concentrations of Fe in bluefish and Cu and Zn in A. rostrata decreased as a function of body weight. Mn content was not related to body weight in either species. The concentrations of Fe in A. rostrata and Cu and Zn in bluefish were also not related to body weight. The authors suggest that the fish, in two different ecosystems, may be in a steady state with regard to Mn, Fe, Cu, and Zn in the environments but not with respect to Hg. On the other hand, the four metals are

7.51 (7.52) AUTOMATED NITROGEN METHOD FOR FEEDS

Gehrke, Charles W., Larry L. Wall, Sr., and Joseph S. Absheer (Experiment Station Chemical Laboratories, University of Missouri, Columbia, MO 65201)
Journal of the Association of Official Analytical Chemists 56, No. 5, 1096-1105 (Sept. 1973)

A fully automated procedure for the determination of nitrogen in grains, forages, feed concentrates, and feed rations was developed. The apparatus consists of an automatic analyzer, a SOLIDprep Sampler II, an auxiliary diluent pump, two proportioning pumps, a continuous digestor, a vacuum pump, a linearized colorimeter with voltage stabilizer, and a recorder. To operate the system at a rate of 20 samples per hour, sample preparation time must be conserved. This is accomplished by homogenizing the sample in a homogenizing vessel. Following homogenation, the sample is withdrawn to a holding coil. The homogenizing vessel can then be cleaned in preparation for the next sample while the analytical system withdraws the sample in the holding coil for analysis. An homogenized sample is mixed with concentrated sulfuric acid and 35% hydrogen peroxide and then is drawn into the digestor. After digestion the sample is subjected to a color development reaction reported by C. W. Gehrke, L. L. Wall, Sr., J. S. Killingley, and K. Inada [JAOAC 54, 651-657 (1971); and JAOAC 55, 467-480 (1972)]. The reacted sample is then compared in a colorimeter to a reference standard. Soy hydrolysate was used as the reference.

7.42 (9.19)

required metabolically and their concentrations found in the fish may be the result of physiological regulation in the tissues. The high activity of organic and inorganic forms of Hg with sulfhydryl groups and lipids in their tissues could reduce the capability of the fish to regulate concentrations of the metal. Furthermore, the levels of available Hg in the ocean may cause the rate of incorporation into fish muscle to exceed the rate of elimination. Additional investigations on other species and metals need to be performed to determine the baseline levels of trace metals in marine organisms and to elucidate the processes that regulate trace metal concentrations in their tissues.
[1 figure, 2 tables, 20 references] SW

7.42 ANALYSIS OF LEAD AND COPPER IN CANNED FOODS OF ANIMAL ORIGIN
(3.3)

Cicero, L., V. Gianni, S. Massa, and L. Basili (Cent Studi Ric. Sanita Mil., Italy)
Chemical Abstracts 79, No. 9, 51906p (Sept. 3, 1973)

7.51 (7.52)

The automated nitrogen method recovers about 90% of the nitrogen from feed samples compared to the AOAC Kjeldahl method. With feed samples containing significant amounts of refractory nitrogen such as vitamin supplements or nonprotein nitrogen, the automated nitrogen method is probably not applicable. The authors suggest use of the automated method in laboratories doing large numbers of protein determination on feed-type materials.
[4 figures, 8 tables, 5 references] SW

7.51 PROTEIN NUTRITION IN FISH. II. DETERMINATION OF METABOLIC FECAL NITROGEN AND ENDOGENOUS NITROGEN EXCRETIONS OF CARP

Ogino, Chinkichi, Jun Kakino, and Mao Song Chen (Lab. Fish. Biochem., Tokyo Univ., Tokyo, Japan)
Chemical Abstracts 79, No. 13, 77362h (Oct. 1, 1973)

6.54

The yield of fish isolate ranged from 60-70% with precipitation by either HCl or lactic acid giving the greater yields. The isolate was white in color and contained more than 90% protein. The isolate amino-acid content differed only slightly from that of raw fish and FPC; compared to soy isolate, the fish isolate had higher lysine and methionine content. Wettability of the isolate was excellent and emulsion capacity was greater than soy isolate and FPC; the isolate was more soluble than either at various pH levels. The foam viscosity of the fish isolate was high and it formed stable foam. The fish isolate was highly dispersible in distilled water and more dispersible than soy isolate in salt solution. In a rat-feeding study, the fish isolate was found to be comparable to soy isolate as a nutritional supplement. The fish isolate had a slight fish flavor. The authors suggested that the flavor could be masked by other flavors; they further suggest that the fish isolate could be used as a binder in the preparation of emulsion products such as frankfurters.
[3 figures, 6 tables, 24 references] SW

6.54 [AKP-VNIRO SYSTEM FOR THE MANUFACTURE OF PROTEIN PASTE
(2.118) FROM SMALL MOLLUSCS]

Terent'ev, A. V., and L. D. Tsareva
Rybnoe Khozyaistvo No. 9, 67-68 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 151, Abstract No. 6R257 (June 1973)

An AKP-VNIRO system is described for the processing of small Antarctic mollusks into a protein-containing product. The system is designed for heavy-duty service aboard factory vessels. FTP

7.45 [THREE METHODS FOR DETERMINING MERCURY IN TUNA PRODUCTS]
(9.19)

Henrioul, A., and F. Henrioul (182 Chaussee de Waterloo, 5002 Saint-Servais, Namur, Belgium)
Annales des Falsifications et de l'Expertise Chimique 65, No. 703, 274-278 (1972) (In French)
Food Science and Technology Abstracts 5, No. 6, 150, Abstract No. 6R253 (June 1973)

The atomic absorption, the dithizone colorimetric, and the nuclear reaction methods for determining mercury in tuna products are discussed. The atomic absorption method was more simple and rapid than the colorimetric method; the nuclear reaction method requires specialized equipment. Five samples of tuna tested showed less than 0.5 p/m of Hg per gram. FTP

7.45 [DETERMINATION OF MERCURY IN FISH]
(9.19) QUECKSILBERBESTIMMUNG IN FISCHEN

Antonacopoulos, N. (Inst. für Biochem. und Tech., Hamburg, Federal Republic of Germany)
Informationen für die Fischwirtschaft 20, No. 1, 17-20 (1973) (In German)
Food Science and Technology Abstracts 5, No. 6, 150, Abstract No. 6R252 (June 1973)

An atomic absorption spectrophotometric method for determining mercury in fish is described. In reproducibility tests, the mercury content of various species of fish ranged from 0.03 to 1.05 mg Hg/kg. FTP

7.53 EVALUATION OF SOXHLET'S AND BLIGH AND DYER'S METHODS IN THE DETERMINATION OF FAT IN MEAT

Prost, E., and H. Wrebiakowski
Z. Lebensmittelunters.u.-Forsch. 149, No. 4, 193-196 (1972) (In English)
Food R.A. Abstracts 26, No. 1, Abstract No. 8, 2 (Jan. 1973)

The effect of each method on the level of fat determined with respect to the type of meat examined and the accuracy of the results obtained were compared. It was concluded that Bligh and Dyer's method is more accurate than Soxhlet's for the determination of fat in meat. C.S.B. Reprinted

7.53 EFFECT OF α-TOCOPHEROL DEFICIENCY ON CARP. III. ANALYTICAL METHOD FOR TRIGLYCERIDE COMPOSITION OF FISH LIPID

Matsui, Masami, Takeshi Watanabe, and Nobuo Ikekawa (Tokyo Res. Lab., Shimadzu Seisakusho Co., Ltd., Tokyo, Japan)
Chemical Abstracts 79, No. 5, 29175c (Aug. 6, 1973)

7.9 (9.19) FISH BILE ANALYSIS: A POSSIBLE AID IN MONITORING WATER QUALITY

Lech, John J., Sharon K. Pepple, and Charles N. Statham (Dept. of Pharmacology, Medical College of Wisconsin, Milwaukee, WI 53233)
Toxicology and Applied Pharmacology 25, No. 3, 430-434 (July 1973)

Monitoring of the quality of water by use of chemical methods is difficult because of the low levels of compounds and the large volume of water involved. Some aquatic organisms are able to concentrate lipid-soluble compounds (such as DDT or the PCB's) to levels many times greater than that in their surrounding water. Thus, there is current interest in the concept of "biomagnification" of chemicals by aquatic organisms and its use in monitoring water quality. Apparently, many species of fish have the enzymes to carry out certain biotransformation reactions. In previous work, the senior author and coworker demonstrated the conjugation of 3-trifluoromethyl-4-nitrophenol with glucuronic acid and its isolation from the bile of exposed rainbow trout. Apparently the trout have the capacity to conjugate certain phenolic compounds and to excrete them in bile in high concentrations.

In the present experiments, rainbow trout (Salmo gairdneri) were exposed to [^{14}C]-carbaryl (A), [^{14}C]-3-trifluoromethyl-4-nitrophenol (B), and [^{14}C]-DDT (C). The fish were able to concentrate these compounds in the bile to a much greater level than that in their surrounding water, the bile-level to water-level ratio for (A) was 947, for (B) was 1,061, and for (C) was 124. Thus, application of this biomagnification concept may be useful as an aid in monitoring water quality. [1 figure, 1 table, 13 references] FTP

7.80 CHILDREN ACCEPT FISH-BASED SCHOOL LUNCH ENTREES

Beach, Betty L., Mary Jo Hitchcock, Grayce E. Goertz (Dept. of Food Science and Food Systems Administration, University of Tennessee, Knoxville, Tenn.), and Anne Cook
Food Product Development 7, No. 7, 104, 106, 110 (Sept. 1973)

About 25 million children are fed daily through local school lunch programs. The potential for more use of fish exists in these programs. A cooperative study by United States and Tennessee State Government agencies resulted in fish entrees that were low cost, nutritious, and easy to prepare in school lunch programs. The target consumers were children between 6 and 12 years of age who participated in the school lunch programs. Fish entrees were developed in the laboratory using five kinds of fish. Small-scale sensory testing was performed using such characteristics as flavor, texture, color, shape, and serving temperature. The 10 most acceptable entree formulations were selected for testing in 20 schools. The entrees contained either canned tuna or mackerel or frozen cod, perch, or haddock. Names were given to each entree to enhance its appeal such as, sailor boy's pizza and tuna dog on frankfurter bun. An hedonic scale was used to measure acceptance. The test plan included a preliminary test day and three following test days, and each school served the same menu each time the entree was tested. The children were instructed in taste testing and marking the score card. Nine of the entrees were rated acceptable by more than 50% of the children participating in the tests. Formulations for the entrees have been reported by B. Beach, G. E. Goertz, and M. J. Hitchcock [School Foodservice J. 25, No. 10, 54-64 (1971)].
[1 figure, 2 tables, 5 references] SW

7.9 (9.19) THE SEPARATION OF COLLECTORS USED AS COPRECIPITANTS OF TRACE ELEMENTS IN SEAWATER BY ADSORPTION COLLOID FLOTATION

Matsuzaki, Carrie, and Harry Zeitlin (Dept. of Chemistry and Hawaii Institute of Geophysics, Honolulu, HI 96822)
Separation Science 8, No. 2, 185-192 (Apr. 1973)

Most trace elements cannot be determined directly in seawater because of the limitations of analytical methods, and thus they must be concentrated prior to analysis. The useful preconcentration techniques include ion exchange, solvent extraction, cocrystallization, and coprecipitation. The last method appears to be the most useful because it is versatile and a wide range of elements can be collected satisfactorily. The disadvantages of the coprecipitation method are the long settling times required and the tedious filtration procedures involved. Recently, the junior author and coworkers published a series of articles describing the use of conventional collectors in combination with an adsorbing flotation process for the separation of some trace cationic and ionic metallic species in water. By using a collector-surfactant-air system at optimum pH, they were able to separate the trace metals by floating them to the surface of the seawater in 2-3 min as an easily removable foam (thus eliminating the time needed for settling and filtration). In the present study, the researchers screened nine surfactants for their ability to float six collectors (which have been used to coprecipitate trace metallic species in seawater) to the surface of seawater by adsorption colloid flotation as a function of pH. The collectors tested were $Fe(OH)_3$, $Th(OH)_4$, $Al(OH)_3$, HgS, CdS, and MnO_2. The surfactants used were dodecyl benzene sodium sulfonate, lauryl pyridinium chloride, N-dodecylamine hydrochloride, sodium laurate, sodium

8.59 THE 3,4-BENZPYRENE CONTENT OF VARIOUS SMOKE PREPARATIONS
(3.4)

Toth, L., and W. Blaas
Fleischwirtschaft 52, No. 9, 1171 (1972) (In German; English summary)
Food R.A. Abstracts 26, No. 1, Abstract No. 137, 23 (Jan. 1973)

Liquid smoke preparations were examined for their 3,4-benzpyrene content and it was found that the use of these preparations for meat products would produce a lower 3,4-benzpyrene content in the meat than conventional smoking methods. However, it was pointed out that thorough toxicological examination of these liquid smoke preparations is necessary. C.S.B. Reprinted

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8.59 BIOCHEMICAL INVESTIGATIONS OF EDIBLE MOLLUSKS OF KERALA.
(1.8) 1. NUTRITIONAL VALUE OF SOME BIVALVES

Suryanarayanan, H., and K. M. Alexander (Dep. Zool., Univ. Kerala, Trivandrum, India)
Chemical Abstracts 79, No. 9, 51935x (Sept. 3, 1973)

8.51 [PROTEIN COMPOSITION OF SHARK MEAT]

Gubanova, A. G. (Vses. Zaochnyi Inst. Pishchevoi Promyshlennosti, U.S.S.R.), K. P. Lemarin'e, and V. P. Skachkov
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya No. 2, 25-26 (1972) (In Russian)
Food Science and Technology Abstracts 5, No. 6, 155, Abstract No. 6R276 (June 1973)

The meat of the sharks (Isurus oxyrinchus and Carcharhinus obscurus) from the Indian Ocean contained albumins, globulins, and myostromins (not present in bony fish). The meat contained 16.2-19.8% stroma proteins which give toughness to the meat. The authors also discuss changes in the basic components of the proteins during processing (maceration, drying, smoking) of the shark meat. FTP

8.51 AMINO ACID COMPOSITION OF TOTAL PROTEINS IN THE BODY
(9.16) OF TWO-YEAR-OLD CARP RAISED IN CROWDED HATCHERY PONDS

Maslova, N. I. (Mosk. S.-Kh. Akad. im. Timiryazeva, Moscow, U.S.S.R.)
Chemical Abstracts 79, No. 7, 41083d (Aug. 20, 1973)

9.12 WHALES' RESPIRATORY VOLUME AS A POSSIBLE RESONANT RECEIVER
(0.4) FOR 20 HZ SIGNALS

Barham, E. G. (U.S. Naval Undersea Center, San Diego, CA 92132)
Nature 245, No. 5422, 220-221 (Sept. 28, 1973)

Long, repetitious trains of powerful, low-frequency sound pulses, that vary about frequencies centered at 20 Hz have been recorded at ocean listening stations. The finback whale is reported to be one of the sources of these sounds. Suggestions have been made that the whales use the sounds as signals in long-range communication. In underwater acoustics, the target strength of a fish is based upon the swim bladder gas-volume resonance at certain frequencies. Applying this phenomenon to whales, a 2,000-l lung volume (reported for a 21.6-m finback whale) was assumed to be a spherical gas form, and its resonance frequency at an arbitrary depth was calculated by the formula of I. B. Andreeva [Soviet Phys. Acoust. 10, 17 (1964)]. The calculated resonance frequency matched the frequencies reported to be produced by the whales. The possible projecting mechanism of the 20-Hz pulses has been speculated to be the resonant respiratory volume (which is suggested to be active in receiving the frequencies) coupled to a transmitting capability.
[1 figure, 12 references] SW

9.1 CHOICE OF COLORS OF FOOD ITEMS BY RAINBOW TROUT
(0.4) (SALMO GAIRDNERI)

Ginetz, R. M., and P. A. Larkin (Institute of Animal Resource Ecology, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 229-234 (Feb. 1973)

Relative to the predation of sockeye salmon fry by rainbow trout, the question was raised as to whether the trout tend to feed more on some colors of food items in particular environmental settings. In this study, eggs of rainbow trout were dyed various colors and were offered in different combinations of two colors, in experimental streams, to rainbow trout juveniles. In a separate test, the color of the bottom of the stream was varied, and in another test the light intensity was varied.

Against a pale, greenish-blue background and in daylight, the color preference, in descending order, of the rainbow trout was blue, red, black, orange, brown, yellow, and green. Although this order of preference related to contrast with the background, there were actual preferences for color. Color combinations such as yellow and black and yellow and blue were preferred. When the background color was varied, color preferences were not statistically demonstrated. When the light intensity was low, the order of preference for colors was yellow, red, blue, and black.

These results seem to indicate a definite color discrimination by the trout and preferences for different colors in particular environmental settings. Such information may eventually be useful in situations where it may be desirable to reduce rates of predation of salmon fry by presenting foods to satiate predators.
[3 tables, 3 references] FTP

9.13 (0.32)(0.38) (1.92) NITROGEN METABOLISM IN CHANNEL CATFISH, ICTALURUS PUNCTATUS--I. TISSUE DISTRIBUTION OF ASPARTATE AND ALANINE AMINOTRANSFERASES AND GLUTAMIC DEHYDROGENASE

Wilson, Robert P. (Dept. of Biochemistry, Mississippi State University, Mississippi State, MS 39762)
Comparative Biochemistry and Physiology 46, No. 3B, 617-624 (Nov. 15, 1973)

The intensive aquaculture of channel catfish has developed rapidly. Knowledge of the nitrogen metabolism of this fish is necessary to design feeds and feeding regimes that will promote maximum production under aquaculture conditions. In the metabolism of nonessential amino acids, glutamic dehydrogenase (GDH), aspartate aminotransferase (AspT), and alanine aminotransferase (AlT) are important enzymes. Experiments were conducted to determine the activity of these enzymes in various tissues of channel catfish.

Samples of tissue were taken from cultured and wild catfish and homogenized and sonified. After centrifugation, the supernatant was assayed for enzyme activity. GDH was assayed in accordance with the method of J. A. Olson and C. B. Anfinsen [J. Biol. Chem. 197, 67-79 (1952)]; AspT was assayed by the method of A. Karmen [J. Clin. Invest. 34, 131-133 (1955)]; and AlT was assayed in the procedure described by F. Wroblewski and J. S. La Due [Proc. Soc. Exp. Biol. Med. 91, 569-571 (1956)].

The results of the assays indicated that the AlT specific activity ranked in the following order in wild catfish tissues from the highest to the lowest: liver>kidney>gill and heart>gut tract>spleen>brain. In cultured catfish AlT specific activity in the tissues ranked as follows: liver>kidney>gut tract and

9.13 (0.32)(0.38) (1.92) NITROGEN METABOLISM IN CHANNEL CATFISH, ICTALURUS PUNCTATUS--II. EVIDENCE FOR AN APPARENT INCOMPLETE ORNITHINE-UREA CYCLE

Wilson, Robert P.
Comparative Biochemistry and Physiology 46, No. 3B, 625-634 (Nov. 15, 1973)

In part I of this series, the tissue distribution of enzymes active in amino-acid metabolism in channel catfish were described. In this present report, channel catfish enzymes active in the ornithine-urea cycle are described. [When the carbon chains of amino acids are used to provide energy in mammals, the reduced nitrogen components of the amino acids are converted to urea via the ornithine-urea cycle. Abstractor's note]

The livers and kidneys of channel catfish were homogenized and extracted and assayed for the enzymes carbamyl phosphate synthetase, ornithine transcarbamylase, those in the arginine synthetase system, and arginase. The assay methods were based on those of G. W. Brown and P. P. Cohen [Biochem. J. 75, 82-91 (1960)]. The assays showed the presence of carbamyl phosphate synthetase, ornithine transcarbamylase, and arginase in liver tissue. The arginine synthetase system in the ornithine-urea cycle was not detected. In the kidney tissue extracts, carbamyl phosphate synthetase and the arginine synthetase system were undetectable; ornithine transcarbamylase and arginase were present. The author suggests that the enzymes required in the arginine synthetase system either may not be present in the liver, or their levels may be too low for the assay method used. Based on

9.14 (1.81) THE EFFECT OF SUPPLEMENTARY ALGAL FEEDING OF A HATCHERY BREEDING STOCK OF OSTREA EDULIS L. ON LARVAL VIGOUR

Helm, M. M. (Ministry of Agriculture, Fisheries and Foods, Fisheries Experiment Station, Conway, Caernarvon, Wales, United Kingdom), D. L. Holland, and R. R. Stephenson
Journal of the Marine Biological Association of the United Kingdom 53, No. 3, 673-684 (Aug. 1973)

An earlier report described the technique for conditioning European flat oysters (O. edulis L.) to produce viable larvae in the laboratory. Included in the technique was the supplementing of the natural food in the seawater supply with cultured unicellular algae. The effect of the extra food on the subsequent vitality of the larvae was not reported. In this present paper, experiments were performed to determine the value of supplementing natural oyster food in seawater with the unicellular alga Tetraselmis suecica (Kylin) Butch. and the effects on the larvae produced. The results indicate that the brood oysters given the added food produced more larvae than the control oysters receiving only the natural phytoplankton in the seawater supply. Many of the broods of larvae from oysters receiving the extra food were liberated sooner; these larvae grew at a faster rate and provided more spat than larvae from the control oysters.

Other reports indicated that lipid is the principal energy reserve of oyster larvae. In this present report, the authors found a positive correlation between the vigor of the larvae, in terms of growth, and the proportion of neutral lipid to total body composition. The viability of the larvae declined as the length of the conditioning period of the adults increased prior to spawning; that is, the

9.15 TOXINS OF CHRYSOPHYCEAE

Shilo, Moshe (Hadassah Med. Sch., Hebrew Univ., Jerusalem, Israel)
Chemical Abstracts 79, No. 5, 28140a (Aug. 6, 1973)

9.15 (9.19) CONCEPTS AND OUTLOOK IN TESTING THE TOXICITY OF SUBSTANCES TO FISH

Brown, V. M. (Water Pollut. Res. Lab., Dep. Environ., Stevenage, England)
Chemical Abstracts 79, No. 9, 49577p (Sept. 3, 1973)

9.14 (1.37)(1.92) COMPOSITION OF AMINO ACIDS IN PROTEINS OF DRY MIXED FEEDS FED TO CARP (CYPRINUS CARPIO) AND TROUT (SALMO GAIRDNERI)

Wuensche, J., and Marie Luise Albrecht (Forschungszent. Tierprod. Dummerstorf-Rostock, Dtsch. Akad. Landwirtschaftswiss, Berlin, Dummerstorf/Rostock, East Germany)
Chemical Abstracts 78, No. 9, 56816y (Mar. 5, 1973)

larvae spawned at the beginning of the supplemented feeding regime were more vigorous than the larvae spawned as the regime progressed. The authors suggest that this loss of vigor of the larvae may be due to the decline in the dry meat weight and the condition of the adult oysters in spite of the supplemented feeding regime.
[5 figures, 5 tables, 12 references] SW

9.14 (1.81)

9.14 (1.37)(1.92) RELATION BETWEEN THE FOOD CONSUMPTION AND METABOLIC RATE OF BLENNIUS PHOLIS

Wallace, J. C. (Inst. Physiol., Univ. Glasgow, Glasgow, Scotland)
Chemical Abstracts 79, No. 3, 16085y (July 23, 1973)

gill>heart>brain and spleen. The AspT specific activity in the wild catfish tissues ranked as follows: heart and liver>kidney>brain>gill and gut tract>spleen. In the cultured catfish, AspT specific activity in the tissues ranked as follows: heart and liver>kidney>brain>gill and gut tract>spleen. The GDH specific activity for cultured catfish tissues ranked as follows: gill>liver and gut tract>kidney>spleen>heart>brain. There was no difference in GDH specific activity in wild catfish tissues. The author concludes that the three enzymes are significant in the overall intermediary metabolism of amino acids in channel catfish. The highest activities were observed in the liver and kidney tissues, and significant activity was found in the gill tissue.
[4 tables, 20 references] SW

9.13 (0.32)(0.38)(1.92)

9.15 (1.92) BIOENERGETICAL ASPECTS OF THE INFLUENCE OF 2,4-D-SODIUM SALT ON THE EARLY DEVELOPMENT STAGES IN CARP (CYPRINUS CARPIO)

Kamler, E. (Dep. Bioenerg. Bioprod., Nencki Inst. Exp. Biol., Warsaw, Poland)
Chemical Abstracts 79, No. 7, 39109y (Aug. 20, 1973)

9.15 (9.19) EFFECT OF SOME DDT AND METHOXYCHLOR ANALOGS ON TEMPERATURE SELECTION AND LETHALITY IN BROOK TROUT FINGERLINGS

Gardner, D. R. (Dep. Biol., Carleton Univ., Ottawa, Ontario, Canada)
Chemical Abstracts 79, No. 9, 49640d (Sept. 3, 1973)

9.14 (9.13) METABOLISM AND NUTRITION OF FISH

Kausch, Hartmut (Limnol. Inst., Univ. Freiburg, Constance, Germany)
Chemical Abstracts 79, No. 9, 50824y (Sept. 3, 1973)

the data yielded by these experiments, the route of urea synthesis in catfish liver is uncertain. The author is conducting further experiments to elucidate nitrogen excretion patterns of channel catfish.
[3 figures, 2 tables, 21 references] SW

9.13 (0.32)(0.38)(1.92)

9.16 CONSTRAINTS TO AQUACULTURAL DEVELOPMENTS

Pritchard, G. I. (Fisheries and Marine Service, Environment Canada, Ottawa, Canada)
Canadian Fisherman & Ocean Science 59, No. 4, 22-27 (Aug. 1973)

Aquaculture should not be viewed as a get-rich scheme nor a quick solution to the protein deficiency in the world. Aquaculture must be considered as a system of production of foods which can be marketed profitably; it must compete for credit, capital, technical expertise, labor, and markets. A broad spectrum of environmental and business activities are covered by such a food production system and include: the ecosystem, production processes and strategies, internal business arrangements, and product development and marketing. The culture of aquatic organisms implies confinement with intensive rearing at fixed locations, and there are certain constraints to the establishment of aquacultural enterprises. The greatest constraint is related to the complexity of the system. Aquaculture depends upon science and technology and requires substantial development costs. Another major constraint is the lack of low-cost food supplies. Fish require high protein feedstuffs and rely on fat rather than carbohydrate for energy. The shortage of processed feeds at reasonable prices to supply fish farming needs is the major deterrent to freshwater aquaculture. Disease is a constraint that continues as a high risk. This is likely to limit the size of the operation. The location of marine aquaculture operations depends upon access to coastal waters that are protected from industrial pollution. Site location can be critical relative to climate, temperature of water supplies, proximity to technical and engineering assistance, and sources of energy. Steady and reliable sources of seed stock for

9.16 (1.87) GENETIC PRINCIPLES; SYSTEMS ENGINEERING USED IN CONTINENT-SPANNING LOBSTER-FARMING RESEARCH PROJECT

Rutherford, Donald
American Fish Farmer & World Aquaculture News 4, No. 9, 4-6 (Aug. 1973)

Other work showed that the American lobster can be raised to maturity in less than 2 years under controlled conditions. Wild lobsters require 5 to 8 years to mature. Using information gained in lobster rearing in the Massachusetts Lobster Hatchery on Martha's Vineyard, Robert A. Shleser, of the University of California at Davis, has undertaken the development of the technology required to grow large numbers of lobsters to marketable size, in a short time, for profit. Systems engineering techniques are being applied to solving the problems of mass lobster culture. Information from a wide variety of scientific disciplines is required in this approach; the researchers include a marine food technologist, civil and sanitary engineers, a fish physiologist, a geneticist, an agricultural economist, and others. The Davis facilities, those at Bodega Marine Laboratory of the University of California, and the lobster hatchery on Martha's Vineyard are involved in the research work. Genetics is important in the project because economically desirable traits in lobsters can be selected such as rapid growth, disease resistance, production of larger claws and tails, and other characteristics. Feed for the lobsters is being investigated to provide ingredients of high nutrition and low cost; synthetic substitutes with nutritive values similar to those obtained from brine shrimp, which is successful in lobster nutrition, are being developed. Achieving maximum growth, low mortality, and freedom from disease depends upon maintaining the quality of water entering the aquaculture project. Closed loop

9.17 (9.3) TWO MECHANISMS THAT MAKE IT IMPOSSIBLE TO MAINTAIN PEAK-PERIOD YIELDS FROM STOCKS OF PACIFIC SALMON AND OTHER FISHES

Ricker, W. E. (Fisheries Research Board of Canada, Biological Station, Nanaimo, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 9, 1275-1286 (Sept. 1973)

In this paper the author examined the history of the yields produced in certain fisheries (mostly salmon fisheries). He found that, not withstanding the best management, the fisheries consistently failed to produce at expected levels. As a result of the analysis, he suggested two mechanisms that could explain the unexpectedly lower yields. The mechanisms are based upon modifications of mathematical models previously reported and other calculations.

The first mechanism has two aspects: the catch taken at a given rate of exploitation is greater when the rate of exploitation has been increasing than when it is steady or falling; in addition, the yield taken from the progeny of the spawning of a given size is greater when the rate of exploitation has been increasing than when it has been steady or decreasing. This mechanism is applicable to single stocks or to mixtures of stocks.

The second mechanism is defined as follows: the recruitment per spawner, from a mixture of stocks of different productivities, is higher when the rate of exploitation is increasing than when it is steady or decreasing. This mechanism is independent of the first mechanism (and additional to it in its effect on the catch).

9.17 SPHAEROMA TEREBRANS: A THREAT TO THE MANGROVES OF SOUTHWESTERN FLORIDA

Rehm, Andrew (Dept. of Biology, University of South Florida, Tampa, FL 33620), and Harold J. Humm
Science 182, No. 4108, 173-174 (Oct. 12, 1973)

A wood boring crustacean, S. terebrans Bate (order Isopoda), can grow to 10 mm in length at the adult stage. It enters the prop roots of red mangroves (Rhizophora mangle L.) through a bored hole of about 5 mm in diameter. The organism reproduces inside the roots. The young pass through all developmental stages within the roots and join the adults in wood boring. In a demonstration of wood boring capability, the isopods were placed in a container of seawater with pieces of mangrove prop roots and seedlings. Within 24 h, the isopods bored into the roots and seedlings and produced hollowing within a few days.

The isopods are attacking stands of red mangroves in the Ten Thousand Islands region and fringes of the southern Florida shoreline. When the prop roots of the mangroves are destroyed, the trees are exposed to undercutting wave and current action. Summer squalls and hurricanes then cause the poorly supported individual trees to fall into the water. The standing trees are then exposed to the same kind of action. Continued attack by the isopod may eliminate the protective outer edge of the mangrove stands; this results in a gradually receding shoreline and threatens the features of the shoreline environment that depend upon the mangrove barrier.

[3 figures, 6 references] SW

9.16 (1.87)

water treatment and circulation systems were developed which remove solid waste, ammonia, and biological materials from the water, and then oxygenates and thermally adjusts it. Synthetic seawater can be used successfully in lobster culture; therefore, they and other species may be cultured in locations not necessarily at coastlines but where market or other factors are favorable. Closed loop systems eliminate the entrainment of pesticides or other environmental poisons in the project water. These poisons could exist in an open system that admits nearby stream water. The space requirements of the lobster are being evaluated to prevent cannibalism among the larger ones. The information generated by these experiments will be applicable to the culture of other aquatic species.
[5 photographs] SW

9.16 PROCESS AND APPARATUS FOR MARICULTURE PRODUCTION

Moe, Martin A., Jr. (Juno Isles, Fla.), and J. P. Dunathan; Oceanography Mariculture Industries, Inc. (pat.)
U.S. Patent 3,765,372 (Oct. 16, 1973)

This patent is for a procedure of raising marine fishes, such as pompanos, under mariculture conditions. By varying the temperature and light exposure, the time to reach sexual maturity, spawning, hatching of fertilized eggs, and rearing of larvae are controlled. SW

9.16

aquaculture operations is a necessity. These sources may be in the form of other aquacultural production or capture from the wild in the larval stage. Cultivation of single species under intense environmental conditions must be watched continuously to minimize pollution effects from auxiliary chemical and pharmaceutical treatments. Multiculture of various compatible species is more desirable.

The author suggests that government assistance programs should be devised to promote aquaculture enterprise. SW

9.16 VETERINARY MEDICAL ASPECTS OF MAINTAINING THE HEALTH OF (9.15) AQUATIC FOOD ANIMALS

Klontz, G. W. (Aqua. Anim. Res. Prog., Dep. Vet. Microbiol., Texas A. & M. Univ., College Station, TX 77843)
J. Am. Vet. Med. Assoc. 161, No. 11, 1489-1491 (1972)
Aquatic Sciences & Fisheries Abstracts 3, No. 6, 223, Abstract No. 3Q6686C (June 1973)

Increases in aquaculture necessitates greater consideration of fish diseases. Of the diseases needing attention, respiratory infection is the most important. Disease prevention practices include immunization administered orally, detection and elimination of carriers, good management and nutrition, and transportation restrictions. The author considers each of these aspects relative to hatchery practices and the field of legislation. SW

9.17 TWO MODELS FOR SEASONAL GROWTH IN FISHES

Pitcher, T. J. (School of Biological and Environmental Sciences, New University of Ulster, Coleraine, North Ireland), and P. D. M. MacDonald
Journal of Applied Ecology 10, No. 2, 599-606 (Aug. 1973)

The average growth in a fish population has been described by means of the von Bertalanffy mathematical model by L. M. Dickie [Mathematical Models of Growth. Methods for the Assessment of Fish Production in Fresh Waters (I.B.P. Handbook No. 3), W. E. Ricker, ed. Blackwell Scientific Publications, Oxford (1968), pp. 120-123]. Modifications of the model by K. R. Allen ["A Method of Fitting Growth Curves of the von Bertalanffy Type to Observed Data," J. Fish. Bd. Can. 23, 163-179 (1966)] or by W. E. Ricker ["Handbook of Computation for Statistics of Fish Populations," Bull. Fish. Res. Bd. Can. 119, 1-300 (1958)] or by D. H. Cushing [Fisheries Biology - A Study in Population Dynamics. Univ. of Wisconsin Press (1968)] are used to relate growth of fish populations to size or yield estimates. This present article describes two modifications of the von Bertalanffy model of fish growth which may be used to account for seasonal growth in fish populations and may also be used in simulation models. Each modification introduces an additional parameter. In the first, the fish population follows the von Bertalanffy model simulation of growth during the summer season but does not increase the length of individuals over the winter. In the second modification, the same effect is achieved by replacing the von Bertalanffy rate parameter K with a sine function having a wave length equal to 1 year. In this mathematical model, changes in the growth rate occur more smoothly. Both modifications may be linked to water temperature in a simulation model.
[5 figures, 2 tables, 10 references] SW

9.17 (9.3)

Under conditions of moderate overexploitation combined with both mechanisms, the historical maximum catch in a salmon fishery could have been twice the maximum sustainable yield (MSY) and was probably rarely less than 1.5 times the MSY. This suggested rate of exploitation is dependent upon the mixture of stocks that were fished and the actual sequence of exploitation rates that took place. Thus, these historical catches have aroused expectations that cannot be matched by the best regulated fishery.
[6 figures, 2 tables, 13 references] SW

9.16 EFFECTS OF ANHYDROUS AMMONIA ON A CENTRAL TEXAS POND, AND A REVIEW OF PREVIOUS RESEARCH WITH AMMONIA IN FISHERIES MANAGEMENT

Champ, M. A., J. T. Lock, C. D. Bjork, W. G. Klussmann, and J. D. McCullough, Jr. (Texas A. & M. Univ., College Station, Tex.)
Chemical Abstracts 79, No. 14, 83320j (Oct. 8, 1973)

9.17 TOWED UNDERWATER CAMERA VEHICLES FOR FISHERY RESOURCE ASSESSMENT

Foulkes, T. J., and J. F. Caddy (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick, Canada)
Underwater Journal and Information Bulletin 5, No. 3, 110-116 (June 1973)

This article is a review of the methods and equipment used to house cameras in underwater work. The following considerations must be taken into account in the design of such equipment: (1) handling of towed vehicles at sea, (2) expendability or recovery, (3) hydrodynamics, and (4) fish behavior. Three main forms of tethered camera vehicles (towed from surface vessels) have evolved: vehicles designed to be lowered to the seabed and triggered when on or near it, sleds towed in contact with the seabed, and towed fish-type vehicles which fly above the seabed controlled by divers or in response to sensors on the vehicle.

Three vehicles were designed by members of the staff of the Fisheries Research Board of Canada in response to three resource-survey problems. The first vehicle designed was the drifting underwater collapsible camera sled (DUCCS). DUCCS was designed to meet the requirements of a backup system for a manned-submersible survey of herring spawn in about 100-m depth-waters. DUCCS was used whenever adverse weather prevented operation of the submersible. In another survey problem, a camera vehicle was required to study the distribution of the queen crab resource in the Gulf of St. Lawrence. The area to be surveyed was extensive, over a fairly level sea floor, and at depths to 400 m. The survey was to be made from centerwell-type side trawlers at speeds up to 3 m/s. The vehicle designed for this investigation was a towed underwater automatic camera sled (TUACS). This was a low-mass

9.19 (9.4) DETERMINATION OF BUDGETS OF HEAVY METAL WASTES IN LONG ISLAND SOUND ANNUAL REPORT. PART I AND PART II

Dehlinger, Peter, W. F. Fitzgerald, S. Y. Feng, D. F. Paskausky, R. W. Garvine, and W. F. Bohlen (University of Connecticut, Marine Sciences Institute, Groton, CT 06340)
Marine Sciences Institute, University of Connecticut, Groton, CT 06340 (June 1973), 166 pp.

This is a report of the first year's activities of a long-term research program of the heavy metal wastes of Long Island Sound. Five integrated projects are involved in determining the budgets of these heavy metal wastes in the sound, involving studies of (1) the fate and concentrations of heavy metals in the water column, (2) the concentrations and effects of these metals in oysters, (3) the water circulation patterns which control water renewal times and flushing rates, (4) the structure and motion of the outflow of the Connecticut River into the sound, and (5) the transport of suspended materials in the sound. The first section of the annual report contains the summary and conclusions, the introduction and statements of the research status, procedures, and results. The last section consists of five appendixes reporting the results of the research studies as follows:

"Budgets of Heavy Metal Wastes in Eastern Long Island Sound: Chemical Investigations," by W. F. Fitzgerald, C. D. Hunt, W. B. Lyons, and R. J. Szechtman. pp. A1-A51. [10 figures, 12 tables, 16 references]

"Trace Elements in Oysters From Connecticut," by S. Y. Feng and G. M. Ruddy, pp. B1-B5. [1 table]

9.19 (8.42) MERCURY IN THE MARINE ENVIRONMENT: CONCENTRATION IN SEA WATER AND IN A PELAGIC FOOD CHAIN

Williams, P. M. (Institute of Marine Resources, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, CA 92037), and H. V. Weiss
Journal of the Fisheries Research Board of Canada 30, No. 2, 293-295 (Feb. 1973)

The purpose of this study was to determine if mercury may be increasingly concentrated along successively higher trophic levels of marine food chains and if the level of mercury in the seawater column is affected by biological activity. Organisms, seawater, and sediment were collected at one open-ocean station (29°00.0' N., 122°31.2' W.) 430 km southeast of San Diego, Calif. The mercury content of the samples was determined by a neutron activation technique. The mercury level in zooplankton increased slightly with depth of sample collected. The mercury concentration in almost all the higher trophic levels of organisms collected at greater depth was similar to that in zooplankton collected at these depths Below 100 m, the mercury content of the seawater was fairly constant. Apparently, biological activity does not account for the vertical profile of mercury in seawater. The following tables give some data on the mercury content of seawater and marine organisms.

Distribution of mercury in the sea

Depth of water sample (meters)	Concentration of mercury (parts per trillion)
10	270
100	96
210	45
330	41
520	29
960	35
1,980	42
3,040	44
4,080	55

9.19 (8.42) CONCENTRATIONS OF SOME TRACE METALS IN PELAGIC ORGANISMS AND OF MERCURY IN NORTHEAST ATLANTIC OCEAN WATER

Leatherland, T. M., J. D. Burton (Dept. of Oceanography, The University, Southampton, England), F. Culkin, M. J. McCartney, and R. J. Morris
Deep-Sea Research 20, No. 8, 679-685 (Aug. 1973)

Modern analytical techniques allow accurate measurements of chemical elements to be made on biological samples. Furthermore, there is growing concern about the effects of trace metals and radioactive nuclides, present in domestic and industrial wastes, on oceanic organisms. Investigations were performed to determine the presence of trace metals in pelagic zooplankton, crustaceans, and fishes collected mostly off the coasts of northwest Africa and the Azores.

The results of the analyses showed that the concentrations of mercury ranged from 0.06 to 0.38 p/m dry weight (in the zooplankton and the fishes) and showed no trend in the various trophic levels. There were wider variations in concentrations of cadmium in the organisms than of mercury; in addition, the concentrations of cadmium were lower in fish tissue than in the other organisms. The average concentration of arsenic in the crustaceans was 25 p/m dry weight; the concentrations were lower in the fish tissues also. Values for antimony concentrations in the organisms were below 0.1 p/m dry weight. The concentrations of zinc varied between 28 and 105 p/m dry weight and appeared to be lower in fish tissues than in zooplankton. Concentrations of mercury in seawater taken from various locations in the northeast Atlantic Ocean ranged from 17 to 142 ng/l; the highest concentrations were found in water below 2,170 m in depth.
[1 figure, 3 tables, 29 references]

SW

9.19 (9.4)

"Circulation in Eastern Long Island Sound," by D. F. Paskausky, A. J. Nalwalk, and D. L. Murphy, pp. C1-C24. [6 figures, 1 table, 8 references]

"Physical Features of the Connecticut River Outflow During High Discharge," by R. W. Garvine, pp. D1-D54. [19 figures, 1 table, 19 references]

"An Investigation of Suspended Material Transport in Eastern Long Island Sound," by W. F. Bohlen, pp. E1-E29. [14 figures, 2 tables, 11 references]

Some of the results of the investigations are: (1) The eastern section of Long Island Sound is effectively flushed by tidally driven currents so that any material entering this area will be effectively mixed and removed by water circulation in a few days time. Thus, the eastern sound is not a sink for heavy metal wastes. (2) The tidal circulation patterns of the eastern sound are highly variable. (3) The outflow of the Connecticut River shows a distinct plume with sharp boundaries or fronts and of a few meters in depth. (4) Mercury, copper, and lead in the water column of the eastern Long Island Sound are organically and inorganically associated. (5) Suspended material in the eastern sound is mostly clay and organic matter. (6) The oysters along the Connecticut coast showed substantial uptake of Hg, Cu, Cd, Mn, Ni, and Zn, but not to the level considered dangerous for human consumption. It appears that the oysters can serve as a biological monitor of heavy metals in the bays and estuaries of Long Island Sound.

A technique for the analysis of trace amounts of mercury was developed that provided a way to distinguish between organic and inorganic forms of mercury. FTP

9.19 (8.42) ARSENIC, CADMIUM, COPPER, MERCURY, AND ZINC IN SOME SPECIES OF NORTH ATLANTIC FINFISH

Windom, H., R. Stickney, R. Smith, D. White, and F. Taylor (Skidaway Institute of Oceanography, 55 West Bluff Road, Savannah, GA 31406)
Journal of the Fisheries Research Board of Canada 30, No. 2, 275-279 (Feb. 1973)

This report contains data on the heavy metal contents of marine fish of the North Atlantic Ocean; the work was part of the baseline study of the International Decade of Ocean Exploration on the quality of the marine environment. Ninety-one samples representing 35 species of North Atlantic fish (Chondrichthys and Osteichthys) were analyzed for arsenic, cadmium, copper, mercury, and zinc. The samples included members of inshore and offshore species.

In the muscle tissue of 77 samples of Osteichthys (14 families, 26 species), the As content ranged from <1.0 to 6.4 µg/g (dry weight); the Cd content, from <0.1 to 1.6; the Cu, from <0.3 to 23.0; the Hg, from 0.1 to 4.5; and the Zn from 7 to 397. In the muscle tissue of the 14 samples of Chondrichthys (6 families, 9 species), the As content ranged from <1.0 to 19.0 µg/g (dry weight); the Cd content, from <0.1 to 2.1; the Cu content, from 1.5 to 3.2; the Hg content, from 1.0 to 5.3; and the Zn content, from 8 to 20. The metals occur at about similar levels in the inshore and offshore species. The arsenic level in the Chondrichthys is higher than that in the Osteichthys, but the levels of the other metals are about the same. Of the various tissues analyzed, the liver had the higher level of metals except for mercury which was higher in the muscles.
[1 figure, 3 tables, 6 references] FTP

9.17

sled that depended upon hydrodynamic forces to keep it on the seabed while under tow. In another investigation, rapid surveys were required of limited areas around the coast of Prince Edward Island. The surveys were made to determine the effects of raking for seaweed on the lobster fishery. The seaweed beds were in water less than 20 m in depth over a rocky bottom. There were many buoy lines and lobster pots that interfered with the survey. The vehicle designed to overcome these problems was the towed underwater research plane (TURP). TURP was a towed fishlike manned vehicle that had maneuverability to avoid obstacles.

The design features and deployment of the vehicles are shown in diagrams and photographs. Costs are described, and possible future improvements to the vehicle designs are discussed.
[10 figures, 17 references] SW

9.19 (8.42)

Description of the marine sample		Mercury content	
Organism (sample)	Depth collected	Wet basis	Dry basis
	m	ppb	ppb
Zooplankton (45% copepods)	30	16	123
Zooplankton (60% copepods)	30	6	55
Skipjack tuna (flesh)	(surface)	180	720
Squid (flesh)	(surface)	56	280
Hatchet fish (whole)	550	22	157
Snipe eel (flesh)	600	26	186
Fish, Cyclothone sp.	600	34	261
Penaeid decapods	600	30	332
Mysid (whole)	1,000	65	406
Fish, Nansenia sp. (whole)	1,000	22	122
Fish, Bathylogus sp. (flesh)	1,200	420	2,800
Zooplankton (45% copepods)	1,200	35	388
Fish, Cyclothone sp. (whole)	1,900	55	323
Zooplankton (60% copepods)	3,200	36	189
Brittle star (whole)	4,300	163	280
Sponge,(whole)	4,300	300	1,580
Sediment, pelagic clay [1]	4,300	18	39

[1] Includes benthic organisms and bottom sediment.

[2 tables, 7 references] FTP

Besch, W. K., I. Juhnke, and A. Kemball (Landesstelle Gewaesserkd. Wasserwirtsch. Planung, Karlsruhe, Germany)
Chemical Abstracts 79, No. 2, 9584g (July 16, 1973)

9.19 RESIDUES IN FISH, WILDLIFE, AND ESTUARIES. ORGANOCHLORINE RESIDUES IN ESTUARINE MOLLUSKS, 1965-72 -- NATIONAL PESTICIDE MONITORING PROGRAM

Butler, Philip A. (Office of Pesticide Programs, U.S. Environmental Protection Agency, Gulf Breeze, FL 32561)
Pesticides Monitoring Journal 6, No. 4, 238-362 (Mar. 1973) Published by U.S. Environmental Protection Agency, 4770 Buford Highway, Bldg. 29, Chamblee, GA 30341.

Part I. General Summary and Conclusions

In the investigations to determine the effects of pesticides on estuarine organisms, mollusks were selected as reliable indicators of the degree of pesticide pollution in the water. Various species of clams, mussels, and oysters were used as bioassay tools in the investigations. Samples of mollusks living in estuaries of 15 coastal states were collected, in the period 1965-72, and analyzed for aldrin, chlordane, DDT and its analogs, dieldrin, endrin, heptachlor, heptachlor epoxide, lindane, methoxychlor, mirex, and toxaphene. The bodies of the animals were homogenized, and extracted with petroleum ether in a Soxhlet apparatus. The extracts were diluted with acetonitrile saturated with petroleum ether and evaporated to dryness; the residue was eluted from a Florisil column. An electron capture gas chromatographic procedure was used to identify and quantify any pesticide residues in the eluted extract.

DDT and dieldrin were found in some samples from every state monitored. The presence of other pesticides was infrequent and at low levels except for toxaphene. A large number of samples from Georgia contained toxaphene which originated from

9.19 VARIATION WITH CHAIN LENGTH IN ACUTE TOXICITY OF ALKYLHYDROXAMIC ACIDS TO SALMON (SALMO SALAR) FRY

Addison, R. F. (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada), and R. P. Côté
Lipids 8, No. 9, 493-497 (Sept. 1973)

Fatty acids and some of their derivatives have been used as ore flotation agents. Recently, articles have appeared in the literature that describe the use of hydroxamic acids as flotation agents. These compounds have the structure RCONHOH where R is an alkyl group. Such a flotation agent, used experimentally in Canada, was found to be toxic to brook trout. It is possible that the toxicity of the hydroxamic acids might vary with chain length. In this study, the researchers determined the toxicity of saturated n-alkylhydroxamic acids to salmon fry using acids of chain lengths from n-$CH_3CONHOH$ to n-$C_{15}H_{31}CONHOH$. Acute toxicity was considered as the LT50, time to death of 50% of the test group. Within the series of from n-$C_6H_{13}CONHOH$ to n-$C_{10}H_{21}CONHOH$, the acute toxicity to the salmon fry increased with increasing chain length of the alkylhydroxamic acid. Under similar conditions of the test, the compounds of shorter and longer chain lengths were not toxic.

[1 figure, 2 tables, 21 references] FTP

9.19 PESTICIDES IN WATER. ORGANOCHLORINE INSECTICIDE RESIDUES IN STREAMS DRAINING AGRICULTURAL, URBAN-AGRICULTURAL, AND RESORT AREAS OF ONTARIO, CANADA--1971

Miles, J. R. W., and C. R. Harris (Research Institute, Canada Dept. of Agriculture, London 72, Ontario, Canada)
Pesticides Monitoring Journal 6, No. 4, 363-368 (Mar. 1973)

The amounts of pesticide residues in water systems draining agricultural, urban-agricultural, and resort areas of Ontario, Canada were compared. Samples of water, bottom mud, and fish collected in the three drainage areas from mid-April to mid-October 1971 were analyzed. The insecticides that were detected included DDT and its analogs, chlordane, dieldrin, endrin, endosulfan, heptachlor and its epoxide, lindane, and aldrin. The collected water samples were analyzed without pretreatment; the bottom mud and fish samples were subjected to extraction and fractionation on Florisil. Techniques of gas-liquid chromatography (GLC) were then applied to detect the residues.

The residues of total DDT in resort area water (Muskoka River) were found to by 0.11 lb per week per 100 sq mi (average); in the agricultural area (Big Creek), 0.05 lb per week per 100 sq mi; and in the urban-agricultural area (Thames River and the city of London, Ontario), 0.03 lb per week per 100 sq mi. The heaviest contribution of DDT came from the resort area drainage system, although use of DDT had been prohibited since 1966. Fish from this area contained 19 p/m total DDT compared to a high of 1.3 p/m in fish taken from the agricultural area. In addition, total DDT concentration in bottom mud was 800 times higher than that in water, and the concentration of DDT in fish was up to one million times higher than that in

9.19 GENERAL PATHOLOGY OF ENDOCARDIAL REACTIONS. TOXIC ENDOCARDIAL LESIONS IN LOWER VERTEBRATES (CARP)

Schulz, Dorothea (Marx von Pettenkofer-Inst., Berlin, Germany)
Chemical Abstracts 78, No. 13, 80564k (Apr. 2, 1973)

9.19 STRONTIUM-90 TRANSFER FROM FISH TO THEIR OFFSPRING

Kulikova, V. G., E. I. Beregovaya, and N. V. Kulikov (Inst. Ekol. Rast. Zhivotn., Sverdlovsk, U.S.S.R.)
Chemical Abstracts 78, No. 13, 81555v (Apr. 2, 1973)

9.19

water. Polychlorinated biphenyls (PCBs) were found in the urban-agricultural area samples of bottom mud and fish at concentrations of 217 p/m and 0.4 p/m, respectively. Interference from PCBs in the samples taken from this area prevented direct GLC determination of DDT. In these cases, DDT was converted to corresponding dichlorobenzophenones, separated from PCBs on the Florisil column, and subjected to GLC. Residues of other organochlorine insecticides were detected at much lower concentrations than DDT; they are listed also.
[2 figures, 3 tables, 6 references] SW

9.19 MONITORING ZINC CONCENTRATIONS IN WATER USING THE RESPIRATORY (1.92) RESPONSE OF BLUEGILLS (LEPOMIS MACROCHIRUS RAFINESQUE)

Sparks, Richard E., John Cairns, Jr., Roger A. McNabb, and Glenn Suter II (Dep. Biol., Virginia Polytech. Inst., Blacksburg, Va.)
Chemical Abstracts 79, No. 2, 9508k (July 16, 1973)

9.19

the effluent of a single manufacturing plant. The incidence of DDT residues varied markedly from mollusks of one drainage basin to mollusks of another, and the amount of DDT residue in the mollusks was low compared to that reported in fish eating birds. From these data the estuarine levels of DDT were determined to be intermittent and low (parts per trillion). In drainage basins containing intensive agricultural operations (California, Florida, and Texas) resudies in samples from the mollusks exceeded 1.0 p/m.

The overall picture of DDT residue levels in estuaries is that of a pronounced decline in the number of samples containing residues in excess of 100 ppb and a large increase in the number of samples containing negligible or undetectable amounts.

Part II. Residue Data -- Individual States

Residue data for the following states are presented: On the Atlantic Coast, New York, New Jersey, Maine, Delaware, Maryland, Virginia, North and South Carolina, and Georgia. The Gulf Coast States sampled were Florida, Alabama, Mississippi, and Texas. On the Pacific Coast, California and Washington were sampled. In tabular form, the data show monthly pesticide residue concentrations in the years of the study, and the mollusk species sampled are also identified. A list of the cooperating state agencies and private contractors, with the names of the investigators involved, is provided.
[17 figures, 30 tables, 17 references] SW

9.19 MERCURY METHYLATION IN AN AQUATIC ENVIRONMENT

Langley, D. G. (Lab. Div., T. W. Beak Consult. Ltd., Toronto, Ontario, Canada)
Chemical Abstracts 78, No. 13, 80477j (Apr. 2, 1973)

9.19 PCBS (POLYCHLORINATED BIPHENYLS) IN THE FIRTH OF CLYDE

Waddington, J. I., G. A. Best, J. P. Dawson, and T. Lithgow (Clyde River Purif. Board, East Kilbride/Glasgow, Scotland)
Chemical Abstracts 78, No. 26, 163666w (July 2, 1973)

9.19 POLYCHLOROBIPHENYLS IN DANUBE FISHES

Nagy, M. (Staatl. Chem. Untersuchungsanst., Regensburg, Germany)
Chemical Abstracts 78, No. 13, 82207v (Apr. 2, 1973)

9.19 A STRESS SYNDROME IN THE HARD CLAM, MERCENARIA MERCENARIA
(1.82)

Jeffries, H. Perry (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881)
Journal of Invertebrate Pathology 20, No. 3, 242-251 (Nov. 1972)

The responses of marine invertebrates to a seasonally changing environment are difficult to distinguish from the effects of pollution and other complications. To recognize the distinctions, a set of easily measured normal physicochemical characteristics is needed that shows the status of homeostatic regulation within a species and its community. Departures of the physicochemical values from those of the normal state would represent symptoms of internal stress. If the symptoms are taken together as a syndrome, the identification of the causes of stress may be recognized. To determine a stress syndrome, observations of morphological changes, histological variations, infection, carbohydrate levels, and the patterns of free amino acids and fatty acids were made on clams from polluted and clean habitats.

The results of the study indicate that in stressed clams there is a high taurine concentration, but the total amino-acid concentration is less than in normal clams. Of the fatty acids present in stressed clams there were low levels of those fatty acids with the 20:5 ratio and a tendency for slightly higher ratios of palmitoleic acid (16:1) to palmitic acid (16:0) than in normal clams. Other indicators of stress in clams are lower concentrations of glycine and carbohydrates than in normal clams. For practical purposes, the author suggests that the ratio of taurine to glycine may be sufficient to recognize abnormalities in the hard clam: a taurine/glycine molar ratio of 2.5-2.9 he considered normal; more than 3.0 symptomatic; and 5.0-6.6 indicative of infection.
[2 figures, 6 tables, 24 references] SW

9.19 EFFECTS OF A ROUTINE RADIOACTIVE RELEASE ON AQUATIC RADIONUCLIDE CONCENTRATIONS

Nelson, D. M., G. P. Romberg, W. Prepejchal, and S. A. Spigarelli (Radiol. Phys. Div., Argonne Natl. Lab., Argonne, Ill.)
Chemical Abstracts 79, No. 2, 9473v (July 16, 1973)

9.19 PREMATURE BIRTHS IN CALIFORNIA SEA LIONS: ASSOCIATION WITH (1.952) HIGH ORGANOCHLORINE POLLUTANT RESIDUE LEVELS

DeLong, Robert L. (Marine Mammal Division, National Marine Fisheries Service, NOAA, Seattle, WA 98115), William G. Gilmartin, and John G. Simpson
Science 181, No. 4105, 1168-1170 (Sept. 21, 1973)

Premature pupping in California sea lions has been reported on the breeding grounds on islands off the coasts of California and Baja California, Mexico. Studies were conducted to determine whether environmental pollutant residues were related to the premature births. Premature births occur from January through mid-May. Premature pups born in January die soon after birth; those born in March, April, and early May live either for a few hours or for several days. After May 15, the death rate decreases and some premature pups survive. On San Miguel Island (California) 242 dead premature pups were counted on Apr. 25, 1970 and 348 on May 18, 1971 from an estimated total population of 10,000 to 15,000. On San Nicolas Island (in the same group as San Miguel) 442 dead premature pups were counted between Jan. 17 and May 3, 1970 by another investigator. He found the female population to be about 5,500.

Within 24 h of giving birth, a group of six postpartum females and their premature pups were collected. A group of four full-term live pups and their mothers were also collected. The liver, brain, and blubber from the cows and pups were analyzed for DDT and its metabolites, dieldrin, and polychlorinated biphenyls (PCB). Organochlorine pesticide and PCB residues were found in all of the tissues that were collected. In the females which gave birth prematurely, DDT residues in blubber and liver were 8.0 and 3.8 times greater, respectively, than in the same

9.19 DIELDRIN. EFFECTS OF CHRONIC SUBLETHAL EXPOSURE ON ADAPTATION TO THERMAL STRESS IN FRESHWATER FISH

Silbergeld, Ellen K. (Stroud Water Research Center, Dept. of Limnology, Academy of Natural Sciences of Philadelphia, Avondale, PA 19311)
Environmental Science & Technology 7, No. 9, 846-849 (Sept. 1973)

The adaptation of low-level, chronic exposure to dieldrin, an organochlorine insecticide, may be achieved by fish only at the expense of losing resistance to environmental stresses. Organochlorine insecticides are well known environmental pollutants; thus, organisms in the environment experience chronic exposure. Other reports indicate that chronic exposure is equivalent to pretreatment in many organisms including possibly, man. Experiments were performed to examine the concept of insecticide pretreatment in fish and subsequent interaction with environmental change. Wild, mature darters, a small fish related to the perch, were captured from a stream that had levels of insecticide pollution below 1 ppb. The fish were divided into three equal groups; fish exposed to dieldrin, fish exposed to thermal stress alone, and controls. Sixty fish were exposed to 2.3 ppb dieldrin, less than one-fourth the LC_{50} for the species. After 30 days, the fish exposed to dieldrin, and 60 unexposed fish, were subjected to increases in water temperature. Thermal stress was applied at the rate of 1° C increase per day to a maximum of 7°-9° C above the ambient temperature of the home stream of the fish. The elevated temperatures were maintained for 4 days, and the experiment was terminated on the tenth day of thermal stress.

9.19 PCB IN WATER: A BIBLIOGRAPHY (9.6)

Anonymous
Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Dept. of the Interior, Washington, DC 20240 (Mar. 1973), iv + 144 pp. Available from the National Technical Information Service, Springfield, VA 22151. Order No. WRSIC73-201, $3.00, $0.95 in microfiche.

This bibliography has a significant descriptor index, a comprehensive index of descriptors and identifiers, and an author index. Each article is abstracted with full bibliographic details and is listed in ascending accession number order.

SW

9.19

The results indicate that during thermal stress 13% of the fish not exposed to dieldrin died; in contrast, 76.5% of the fish exposed to dieldrin died. Metabolic indicators, such as blood glucose levels, feeding activity, growth, oxygen consumption, opercular movement, whole body lipid content, and liver condition, were measured during the experiment. During the first 15 days of exposure to dieldrin, the fish exhibited significant changes in these indicators except for opercular movement. After 15 days there were reversals in the changes (except for liver damage), indicating that the fish had adapted to dieldrin. In terms of the same indicators, the fish adapted to dieldrin remained different from the unexposed fish. The author concluded that exposure to dieldrin impaired the ability of the fish to make metabolic adjustments required by the increase in the environmental temperature.
[2 figures, 2 tables, 31 references] SW

9.19 DDT IN SOME NEW ZEALAND MARINE AND FRESH WATER FAUNA

Soily, S. R. B., and D. L. Harrison (Wallaceville Anim. Res. Cent., Minist. Agric. Fish., Wellington, New Zealand)
Chemical Abstracts 79, No. 13, 74614f (Oct. 1, 1973)

9.19 NONIONIC SURFACTANTS WITH LOW TOXICITY TO FISH

Iwatsuki, Toshihiro, and Kazuhiro Murai (pat.) (Sanyo Chemical Industries, Ltd.)
Japan. Kokai 73 14,594
Chemical Abstracts 79, No. 2, 7167z (July 16, 1973)

9.19 TOTAL MERCURY IN SOME AGRICULTURAL AND INDUSTRIAL FISH BREEDING GROUNDS AND IN VARIOUS RIVERS AND LAKES IN CENTRAL ITALY

Caracciolo, S., C. Di Silvestro, A. Loretti, A. Perna, and N. Travaglini (Ig. Controllo Vet. Pesca, Ist. Sper., Pescara, Italy)
Chemical Abstracts 78, No. 26, 163655s (July 2, 1973)

9.19 POLLUTION OF THE "EL CARPINCHO" POND (PAMPASIC REGION, ARGENTINA) AND ITS EFFECTS ON PLANKTON AND FISH COMMUNITIES

Freyre, Lance (Inst. Limnol., Univ. Nac. La Plata, La Plata, Argentina)
Chemical Abstracts 78, No. 26, 163663t (July 2, 1973)

9.19 (1.95) MERCURY-SELENIUM CORRELATIONS IN MARINE MAMMALS

Koeman, J. H., W. H. M. Peeters, C. H. M. Koudstaal-Hol (Dept. of Toxicology, Agricultural University, Wageningen, The Netherlands), P. S. Tjioe, and J. J. M. De Goeij (Interuniversity Reactor Institute, Delft, The Netherlands)
Nature 245, No. 5425, 385-386 (Oct. 19, 1973)

Samples of liver and brain tissues from specimens of the common seal (Phoca vitulina) found dead in Netherlands waters were examined for mercury. Mercury levels of 225-765 p/m (wet weight) were found in liver tissue and 9.9 to 31 p/m in brain tissue. Other reports of animals experimentally poisoned with methylmercury, and the high levels of mercury found in the seal brain tissue are suggestive that the seals were affected by the toxicity of methylmercury. Cadmium, arsenic, selenium, zinc, and antimony were studied in seal tissues. Selenium was present at concentrations of 46-134 p/m (wet weight) in the livers of five seals in which the Hg concentrations ranged from 257 p/m to 326 p/m. The levels for Cd were 0.05-0.30 p/m, for As 0.20-1.7 p/m, and for Zn 25-34 p/m; the level of Sb was lower than the detection limit of 0.01 p/m. Further analyses for Hg and Se were conducted on juvenile and adult seals, porpoises, and dolphins. Based on results of these studies the authors suggest that the concentration of Hg in the livers of the marine mammals is strongly correlated with the concentration of Se, but not with the other elements. They further suggest that the correlation reflects a causal relationship between Hg and Se in marine mammals. These results support the findings of other workers who have reported that Hg and Se occur together in animal tissues and are associated to proteins by means of sulfur.
[1 figure, 2 tables, 15 references] SW

9.19 (1.952)

tissues from females with full-term pups. The concentration of DDT in the brain tissue of premature pups was twice that in the brain of full-term pups. In the females which pupped prematurely, the concentrations of PCBs in the blubber, liver, and brain were 6.6, 4.4, and 2.4 times higher, respectively, than those in the same tissues from females that pupped normally. Dieldrin residues were detected in some samples of tissue and the levels found were low. The authors suggest that the magnitude of the differences in residue levels found in the two groups of sea lions can be considered for a possible cause and effect relationship.
[1 figure, 1 table, 18 references] SW

9.19 (9.3) OFFSHORE DEVELOPMENT AND MARINE POLLUTION

Hardy, Michael (Office of Legal Affairs, United Nations Secretariat, New York, N.Y.)
Ocean Development and International Law Journal 1, No. 3, 239-273 (Fall 1973)

This paper was prepared for a Regional Conference on the Petroleum Industry in Africa that was organized by the Economic Commission for Africa. The Conference was originally scheduled to be held in October 1972 but was rescheduled for some time in the fall of 1973. The paper is divided into four parts. The first part defines marine pollution and its causes. The definition of marine pollution prepared and adopted by various bodies of the United Nations follows:

"Introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) resulting in such deleterious effects as harm to living resources, hazard to human health, hindrance to marine activities including fishing, impairment of quality for use of sea water and reduction of amenities."

The second part deals with offshore development and marine pollution relative to international law and the actions of various international bodies. The third section contains a survey of national legislation relating to marine pollution caused by offshore mineral development; it covers the legislation and regulations of 18 countries in North America, Europe, Far East, Middle East, Latin America,

9.2 A SYSTEMS APPROACH TO ANALYSIS OF COMMUNICATION OF MANAGEMENT INFORMATION

Schruben, Leonard W. (Kansas State University, Manhattan, Kans.)
Feedstuffs 45, No. 42, 25, 28 (Oct. 8, 1973)

A procedure is described to organize an inquiry into: (1) Who communicates what information to whom? (2) Who needs what information? and (3) How can the communication system be arranged to ensure that people get information as required without unnecessary effort? A communications matrix is defined as a communication system that has been assembled with a set of format rules governing the content of each element of the matrix. Subsystems representing individual parts of a company are connected with each other in the matrix. The communications matrix is comparable to the table on a roadmap showing distances between cities. To find the distance between two cities the common element in the table is traced. In the communications matrix the common element can be found between two subsystems, such as between the purchasing group and the receiving group. An example of a communications analysis matrix is provided with an explanation for its use, and a communications flow chart is also shown.
[2 figures] SW

9.19 MERCURY CONTAMINATION OF MARINE LIFE IN PERU

Bouroncle C., Alfonso, Medardo Echegaray R., and Juan Chang Say Y. (Min. Salud Peru, Peru)
Chemical Abstracts 79, No. 6, 34865g (Aug. 13, 1973)

9.2 (9.3) THE AMERICAN LOBSTER FISHERY: ECONOMIC ANALYSIS OF ALTERNATIVE MANAGEMENT STRATEGIES

Bell, Frederick W. (National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, and Richard F. Fullenbaum (Office of Management and Budget)
Marine Fisheries Review 35, No. 8, 1-6 (Aug. 1973)

The authors' purpose was to explain the use of bioeconomic models in assessing alternative fishery management strategies. The data base for the American lobster fishery was used in the analyses, but the data were considered less than optimal. The authors first consider some of the basic elements used in constructing a bioeconomic model of the American lobster fishery and then they evaluate the economic impact of five alternative policies that could be adopted to manage the entire inshore fishery for lobsters. All the management strategies are assumed to have some central authority to impose the regulations; furthermore, they have two common objectives: (1) to protect the resource from overexploitation and (2) to allow maximum freedom for operators to function in a free enterprise.

The inshore American lobster resource appears to have reached maximum sustained yield and the industry is fully capitalized. (The maximum sustained yield means the largest number of pounds of the resource that can be caught on a long-run annual basis with a given level of fishing effort without impairing the viability of the stock. A capitalized fishery represents the inputs of vessels, fishermen, gear, and technology used to harvest a fishery resource.) This situation has been brought about by a rapid expansion of fishing effort resulting from

9.19 (1.0144) CONTAMINATION OF SOME COASTAL AREAS OF THE BLACK AND BALTIC SEAS BY CARCINOGENIC HYDROCARBONS

Gortalum, G. M., and L. P. Smirnova (U.S.S.R.)
Chemical Abstracts 79, No. 16, 96614h (Oct. 22, 1973)

9.3 MARINE OCCUPATIONS IN THE TEXAS COASTAL ZONE

McKinnerney, Beryl, and Donald L. Clark (College of Education, Texas A. & M. University, College Station, TX 77840)
Sea Grant Publication No. TAMU-SG-73-606, Sea Grant College and College of Education, Texas A. & M., College Station, TX 77840 (July 1973), xv + 72 pp.

This report was prepared for high school students, counselors, teachers, and curricular developers having interest in information in marine related occupations. The material was obtained through reviews of occupational publications and by interviews with people associated with marine occupations in Texas. The various industries and activities were divided into the following groups: fish and foods, harbor maintenance and activities, merchant marine industry, marine recreation and tourism, research and development, petroleum industry, and shipbuilding and repair. The report describes the basic occupations related to these industries, with the exception of marine recreation and tourism.
[1 figure, 4 tables, 16 references] FTP

9.19 SELECTED METALS IN SEDIMENTS, WATER, AND BIOTA IN THE ILLINOIS RIVER

Mathis, B. J., and T. F. Cummings (Dep. Biol., Bradley Univ., Peoria, Ill.)
Chemical Abstracts 79, No. 14, 83145f (Oct. 8, 1973)

9.2 (9.3)

(1) free access to the resource, (2) a rising market for lobsters, and (3) a decline in seawater temperature (increases in seawater temperature cause the lobsters to grow more rapidly thus the catch per trap in weight is increased).

Five alternative management strategies are discussed as follows: (1) Impose a freeze on existing (1969) lobster fishing effort by placing a license fee on traps. Under this scheme, the regulatory agency would impose a license fee on traps at a rate that would tend to keep the level of fishing effort constant despite any increase in demand for lobsters. (2) Reduce the existing level of lobster fishing effort to that necessary to harvest the maximum sustained yield by placing a license fee on traps. Under this scheme, a license fee per trap would be assessed at a rate that would reduce the level of existing effort to that necessary to harvest the maximum sustained yield despite an increase in the demand for lobsters. (3) Reduce the existing level of lobster fishing effort to that necessary to make the marginal cost of landing them equal to ex-vessel price by placing a license fee on traps. This strategy is designed to obtain the greatest "net economic benefit." (4) Issue "stock certificates" to each vessel owner based on average catch over the last 5 years and to fix the existing level of lobster fishing effort. This scheme provides for the recognition of the historic fishing rights of each fishing firm. The stock certificate would be evidence of private ownership, and the fisherman would be free to catch his allotted share of lobsters or to sell his stock certificates. (5) Imposition of no management strategy. The consequences of doing nothing would be overcapitalization and eventual reduction in the catch of lobsters.

The choice of management strategies for the inshore American lobster fishery was not discussed.
[2 figures, 1 table, 7 references] FTP

9.19 (9.3)

and Africa. The last part is a series of reflections on marine pollution and the necessity for new legislative and regulatory measures in the various countries engaged in offshore development.
[73 footnotes] FTP

9.19 TOXICITY OF METHYLMERCURY (0.4)

Skerfving, Staffan (Sweden)
Chemical Abstracts 79, No. 5, 27983r (Aug. 6, 1973)

9.2 HUNTERS, TRAPPERS, AND GATHERERS OF THE SEA: A COMPARATIVE STUDY OF FISHING STRATEGIES

Cove, J. J. (Dept. of Sociology and Anthropology, Carleton University, Ottawa, Ontario, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 2, 249-259 (Feb. 1973)

The author compared fishing strategies in the Newfoundland offshore fishery, the inshore fishery of British Columbia, and an oyster fishery of Cornwall, England. From the Newfoundland fishery, he developed a model to account for differences in risk-taking by fishing captains. In this model, relations between reward structure, technology, and environment were specified that influenced the fishing captains' evaluations and hence their decisions.
[2 tables, 27 references] FTP

9.19 USE OF FISH AS SENSORS IN INDUSTRIAL WASTE LINES TO PREVENT FISH KILLS (1.92)

Cairns, John, Jr., Richard E. Sparks, and William T. Waller (Dep. Biol., Virginia Polytech. Inst., Blacksburg, Va.)
Chemical Abstracts 79, No. 5, 28054a (Aug. 6, 1973)

9.2 (9.3) EXTRACTING RENT FROM OCEAN RESOURCES: DISCUSSION OF A NEGLECTED SOURCE

Pearson, Charles S. (School for Advanced International Studies, Johns Hopkins University, Washington, D.C.)
Ocean Development and International Law Journal 1, No. 3, 221-237 (Fall 1973)

The author discusses a proposal relative to ocean dumping of wastes in which the international community would establish a system of taxation or charges on ocean dumping, with revenues being equally distributed in accordance with the "common heritage of mankind" concept of ocean resources. This paper, he indicates, represents a preliminary examination of the subject designed to stimulate further discussion and more exacting analysis. The paper is in two sections: Section I is a brief overview of ocean dumping and control instruments, and Section II deals with the rationale for the proposed tax scheme. Section II is divided into the environmental resource allocation issue and the matter of ocean resource rents. An ocean dumping tax scheme can lead to a significant improvement in resource allocation, thus permitting higher environmental standards at lower real cost. Also, the assimilative capacity of the oceans can be considered as an economic resource from which rent can be extracted by the international community. An ocean dumping tax would alter the present situation in which the rent is appropriated by ocean dumpers.
[34 footnotes] FTP

9.3 FREEDOM FOR SCIENCE IN THE OCEANS

Cadwalader, George (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 182, No. 4107, 12-20 (Oct. 5, 1973)

The doctrine of freedom of the seas provided the basis for all law of the sea for almost 300 years. Since 1945, several coastal states have expanded their claims of jurisdiction to include that part of the ocean called the "high seas"; thus, the traditional law of the sea was nullified in these areas. Additionally, the doctrine of freedom of the seas has come under increasing criticism, primarily from the developing countries. In response to these pressures, the U.N. General Assembly called for a new Law of the Sea Conference to begin in 1973. The Seabed Committee, consisting of representatives from 90 nations, is currently engaged in negotiations in preparation for the conference. The author suggests that the conference will inevitably result in some form of national or international control over the ocean space. The extent of the jurisdiction exercised will be a matter for negotiation, and freedom for science will be one of the controversial bargaining points. The case for minimum regulation of science must be constructed on an assessment of what can be achieved in the prevailing political climate, and any bargaining must be made in terms of specific proposals aimed at satisfying those who would restrict or prevent scientific activity in their jurisdictions.

Representatives of the developing countries are requesting new laws governing uses of the sea in order to gain access to the ocean resources which are the common heritage. These representatives argue that seabed resources are denied to the developing nations because of their economic inability to exploit them.

9.3 (9.19)(9.11) U.S. PRESENTS PROPOSAL AT PREPARATORY SESSION FOR LAW OF THE SEA CONFERENCE

Stevenson, John R., John Norton Moore, and Donald L. McKernan (U.S. Dept. of State, Washington, D.C.)
Department of State Bulletin 69, No. 1787, 397-415 (Sept. 24, 1973)

The United Nations Committee on the Peaceful Uses of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction met at Geneva during July 2-Aug. 24, 1973. This article contains the individual statements by the authors at this meeting. Stevenson discussed the rights and duties of States in the coastal seabed economic area; Moore discussed protection of the marine environment; and McKernan discussed scientific research in the marine environment.
[9 footnotes] FTP

9.7 (2.11) [PSYCHOLOGICAL PROFILE OF A GOOD MARINER ON THE BASIS OF TESTING STUDENTS OF A MARINE ENGINEERING SCHOOL IN SZCZECIN] PROFIL OSOBOWOŚCI DOBREGO MARYNARZA NA PODSTAWIE BADAŃ STUDENTÒW WSM W SZCZECINIE

Okwieciński, Ireneusz (Studium Wychowania Fizycznego)
Zeszyty Naukowe No. 3, 189-208 (1973) (In Polish, English summary) Wyższa Szkoła Morska Biblioteka, Wały Chrob Ego 1, 70-500 Szczecin, Poland

Ninety-two first year students of the Marine Engineering College (MEC) and thirty-four other undergraduates having 5 years of experience in the merchant marine were given the Thurstone-Choynowski "Scale of Temperaments" psychological test. The objective of the investigation was to estimate the range of development of distinctive features of personality that determine the success of an individual in the profession of seaman. Other work has shown an appreciable difference between students of MEC and students in other schools. On the basis of views expressed by officers in the Polish merchant marine, and students, teachers, and research staff of the MEC, a model of a good seaman was established. The model was compared to the profile of distinctive personality features resulting from the psychological tests given to the students of MEC. The comparison indicated that the students with merchant marine experience approximated the model closer than the first year students. The results also indicated that the features of personality that are of fundamental value in the profession of seamen can be determined rapidly and accurately by using the Thurstone-Choynowski psychological test.
[2 figures, 3 tables, 17 references] SW

9.3 THE DEVELOPMENT OF EUROPEAN REGIONAL LAW OF THE SEA

Janis, Mark W. (Naval Postgraduate School, Monterey, Calif.)
Ocean Development and International Law Journal 1, No. 3, 275-289 (Fall 1973)

The author explores the concept of regional law of the sea as a more practical alternative either to a new global order for the oceans or to extension of national maritime jurisdictions. The author studied the European Common Market's (and three other European groups') maritime activities; in addition, he examined the possible effects of these activities on the development of a European system of regional maritime law.

The European Economic Community (EEC) has taken two important steps towards creating a regional European law of the sea: The EEC Common Fisheries Policy (established by the Council of Ministers on Oct. 20, 1970) and the EEC Commission's decision of Sept. 10, 1970 to apply the treaty of Rome and EEC regulations to the continental shelf. The Common Fisheries Policy opened national territorial waters within the EEC to all Community fishermen and provided the foundation for the generation of Common Market fishing policy. The decision on the continental shelf also brought the exploration and exploitation of hydrocarbons on the shelf within EEC regulations and supervision.

Regional systems of law of the sea have two advantages: first, they are easier to create, and secondly, they are preferable to national extensions of maritime jurisdiction. Regional law of the sea also would provide a single set of regional legal rules in place of any number of national sets in the same region. Regional systems might simplify exploitation of the resources, simplify navigation of the seas, and provide for a better chance for successful control of marine pollution.
[34 footnotes] FTP

9.3 TOWARDS A NEW REGIME FOR OCEAN DEVELOPMENT

Oda, Shigeru (Tohoku University, Japan)
Ocean Development and International Law Journal 1, No. 3, 291-302 (Fall 1973)

The author points out two distinct trends relative to ocean development and law of the sea: (1) the growing interest of coastal States in offshore resources that may influence developments relative to coastal jurisdiction, and (2) the desire by certain countries for international control of resources of the vast ocean areas. These controls may eventually affect the concept of free competition.
[25 footnotes] FTP

9.7 PROCEEDINGS VOCATIONAL FISHERIES EDUCATION WORKSHOP

Lund, Marlene, A. (editor)
Published for Pacific Sea Grant Advisory Program by Oregon State University Extension Service, Marine Advisory Program, Corvallis, OR 97331 (1973), v + 46 pp.

The workshop was held Apr. 18-19, 1973 in Portland, Oreg., and was sponsored by Pacific Sea Grant Advisory Program. The workshop began with a series of presentations by specialists following an introduction to the general subject by Howard Brock; John B. Glude defined the U.S. commercial fisheries; Maynard A. Steinberg discussed the future of the fisheries; and R. Barry Fisher explained the needs of a viable commercial fishery.

Four current training programs were discussed as follows: the high school level by Robert Simpler; the community college program by Jackson B. Hargis; the vocational technical school level by John Ronning; and the college program by Graham A. Drew.

A panel discussion of the subject "Industry Reaction" was recorded, with the following participants: R. Barry Fisher, Arthur Paquet, Jay Gage, and Ross Lindstrom.

Small group discussions based on objectives in fisheries education were held followed by a general discussion. The concluding remarks at the workshop were made by William Q. Wick.

The appendices give (1) a list of schools on the west coast and Hawaii that teach marine technology and courses in commercial fishing and (2) the participants in the workshop with their affiliations. SW

9.3

The doctrine of common heritage provides the right for a state to share in seabed resources independent of its economic power. Representatives of the developing countries favor the doctrine of the common heritage and also the right to claim wide areas of national jurisdiction over ocean space off their coasts. Such national claims would remove from the area of the common heritage most of the seabed resources. This contradiction has not caused the representatives of the developing countries to change their positions since the most advantageous bargaining position is to claim ownership of their parts of the continental shelf and to use the doctrine of common heritage to share in whatever resources lie beyond.

Freedom for scientific investigations of the oceans can be justified on the basis that research may yield knowledge of potential social good, and no state accepting the doctrine of common heritage can properly erect barriers against it.
[11 references] SW

9.19 MARINE RADIOECOLOGY. AIM AND PROSPECTS

Ehrhardt, Jean Paul (Serv. Sante Armee, France)
Chemical Abstracts 79, No. 14, 83103r (Oct. 8, 1973)

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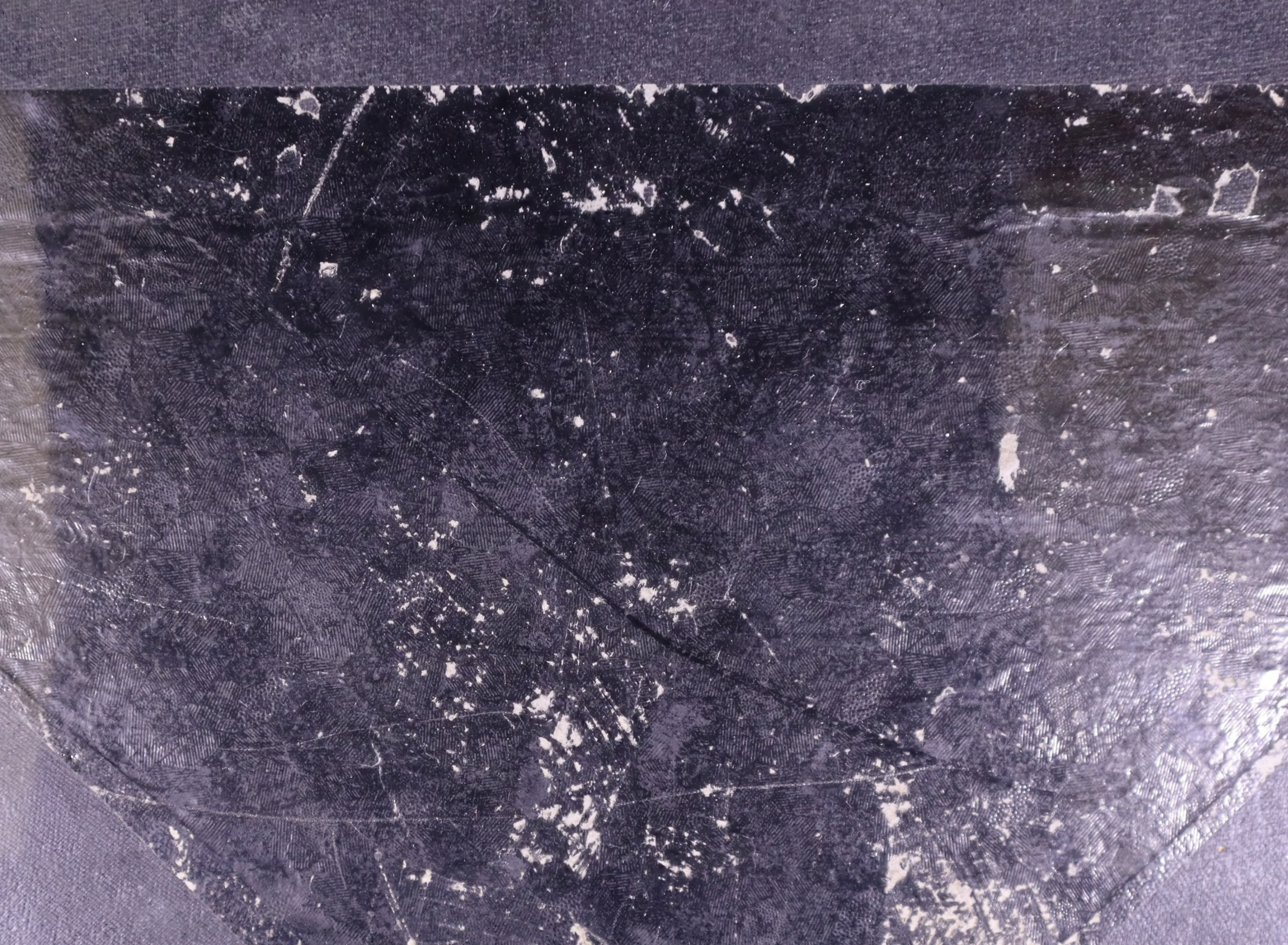
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